COLONY OF THE GAMBIA.

IMPERIAL BUREAU OF MYCOLOGY
15 OCT 1927

THE ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE PERIOD JANUARY 1ST, 1926, TO MARCH 31ST, 1927.

Price 5/-

PUBLISHED BY THE CROWN AGENTS FOR THE COLONIES,
4, MILLBANK, LONDON, S.W. 1.

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STAFF OF THE DEPARTMENT OF AGRICULTURE, THE GAMBIA.

Director of Agriculture ...	A. J. Brooks, F.L.S., F.C.S., F.R.H.S.
Assistant Director	C. W. Line, B.A.
Superintendents of Agriculture	J. Pirie, M.M., T. R. Hayes, M.Sc., J. Sparrow, M.M.
Agricultural Assistants ...	O. Waddar and G. D. Edwards.
Produce Inspector	E. J. Maurice.
Clerk	R. C. Camara.
Interpreters	S. Dibba, D. Bass and K. O. Kamara.
Agricultural Overseers in charge of Seed Farms.	Karamo Sanneh, Samuel N'Gum, B. Cummings, Daniel Forbes, John Touray, Jacob Bruce, Surey Jallow, Famara Sonko, Lamin Ceesay, Yarra Mang-Sagnia.

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE, THE GAMBIA,

FOR THE PERIOD JANUARY 1st, 1926, TO MARCH 31st, 1927.

The groundnut crop which is the staple industry of this Colony is grown between the months of June to November. The harvesting and buying of this crop commences in December and is exported between January and May of the following year.

With a view to rendering the Annual Report of this Department more valuable by enabling both the growing and the selling of the crop to be commented upon in the same report it has been decided that in future the period covered by the Annual Report of this Department will end on March 31st instead of December 31st.

The present report therefore covers a period of fifteen months, January 1st, 1926, to March 31st, 1927.

STAFF CHANGES.

Mr. J. Sparrow, who was appointed Agricultural Superintendent at the end of 1925, arrived in the Colony and assumed his duties on January 23rd. Mr. Sparrow formerly occupied a similar position in Kenya, East Africa.

Mr. J. Pirie proceeded on leave on January 29th and returned to the Colony on August 20th. During this period he took a course of plant breeding at the Welsh Plant Breeding Station, University College of Wales, Aberystwyth.

Mr. C. W. Line who proceeded on leave on December 8th, 1925, returned to the Colony on June 3rd.

Mr. T. R. Hayes proceeded to England on leave on December 10th.

Mr. R. C. Camara, Probationer, Governor's Office, was appointed clerk on May 10th.

Illness of Staff.

It is with much regret that I have to record the death of Mr. P. H. Bass, Interpreter, which took place on May 3rd after a short illness. Mr. Bass was appointed Interpreter in February, 1924, and also performed the duties of Clerk to the Director. This Department has been deprived of the services of a valuable officer.

Four European officers were on the sick-list for an aggregate of 91 days.

GENERAL AGRICULTURAL CONDITIONS.

Seed Distribution.

The groundnut seed requirements of the Travelling Commissioners for 1926 were much below those of the previous year, only 23,200 bushels being applied for, as against 44,792 bushels in 1925. This seed was distributed by the Agricultural Department as follows :—

Province.	1925. Bushels.	1926. Bushels.
North Bank	6,400	280
South Bank	16,000	500
McCarthy Island	7,232	5,924
Upper River	13,200	15,896
Kombo and Fogni...	1,960	600
	44,792	23,200

The total cost of this seed, including bags, was £5,122. 6s. 8d. The Travelling Commissioners again rendered valuable assistance in supervising the distribution.

Efforts of the Agricultural Officers.

Throughout the rains the officers of this Department were travelling in the Protectorate giving advice and urging the extension of cultivated areas. From the increased areas under cultivation it is anticipated that the crop for 1927—notwithstanding the unfavourable weather conditions—will not be below 60,000 tons and may reach 65,000

Growing Season.

Groundnuts.

The 1926 growing season proved a very trying one and caused considerable anxiety to this Department. During the short growing period—June to September—five periods extending over six consecutive days without rain were recorded. After germination was well advanced a rainless period of fifteen days was experienced which caused considerable injury to the early sowings. The second sowings in July suffered in a similar manner through a ten days' drought. Further dry periods occurred in August. In September when the groundnut crop was in vigorous growth the rains ceased for sixteen days, causing the vines to ripen before growth was completed. This in some cases prevented the nuts from filling properly, and resulted in the average weight of a cut bushel of nuts weighing 26 lbs., as against the usual 28 lbs. Luckily, this experience was not general and the nuts now coming in from Senegal will more than make up for the shortage due to the adverse weather conditions.

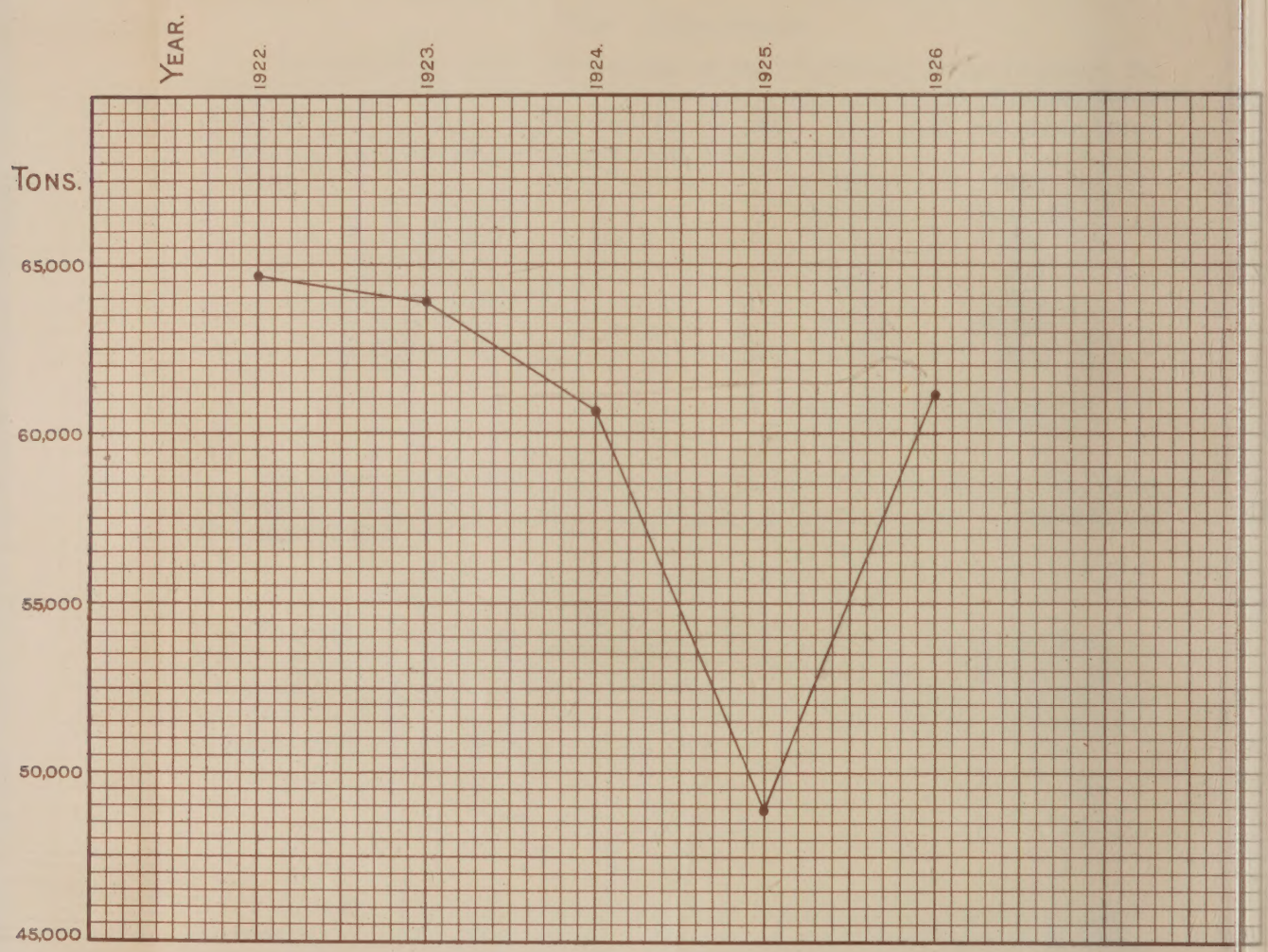
Rice.

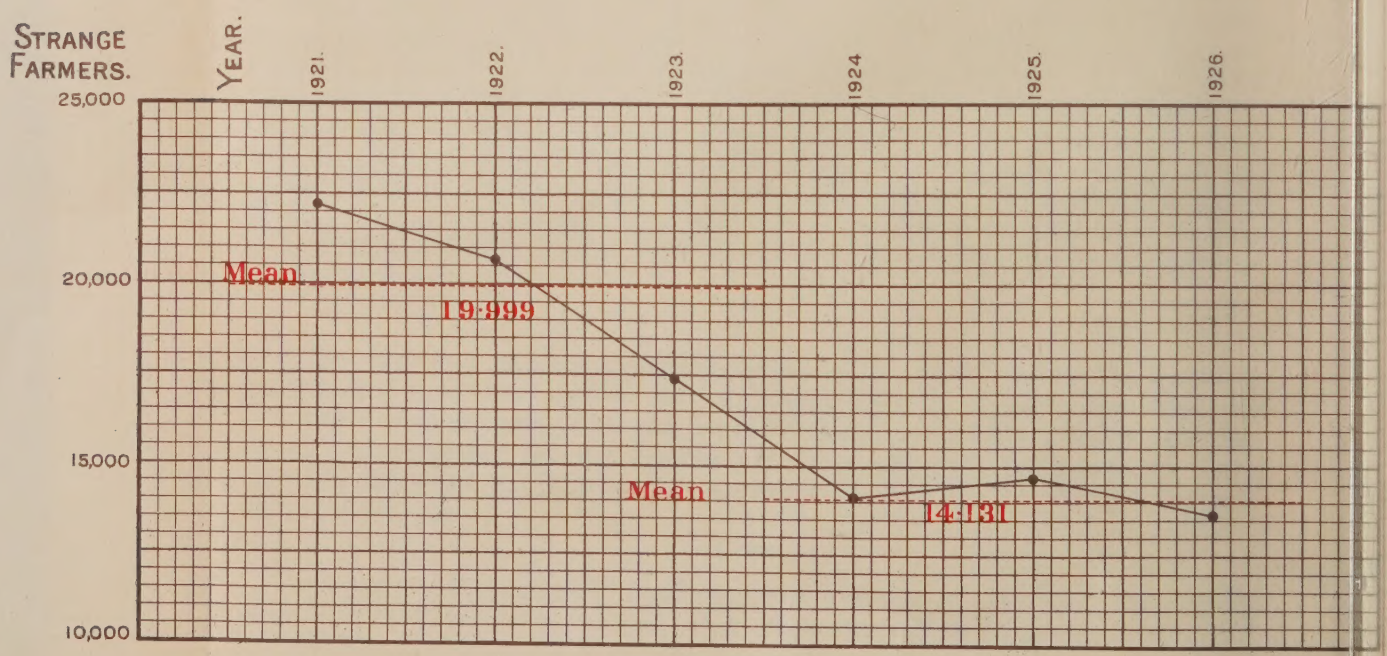
The rice crop suffered considerably for lack of rain during the growing period, and was much below that of normal years. In some localities the rice fields were so poor that the farmers abandoned them without reaping. It will be necessary for the Government to issue rice next season if there is to be sufficient food for our own people as well as the strange farmers at planting time.

Corn.

The corn crop is excellent although not quite as good as last year, which was a wonderful year for corn. It is, however, much above the average.

CHART I.—SHOWING THE RELATIONSHIP BETWEEN THE ANNUAL EXPORT CROP OF GROUNDNUTS AND NUMBER OF STRANGE FARMERS, FOR THE YEAR 1922-1926.





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Agricultural Progress.

Agricultural progress is often more real than apparent, and is sometimes difficult actually to place on record, but if we carefully compare the conditions which existed in 1923-4 with those of the last two years, I am of the opinion that the future may be met with optimism and confidence.

Labour and Production.

In 1923-4, the groundnut crop grown and exported—excluding Saboya nuts in transit—was 58,980 tons. The number of strange farmers who helped to grow that crop was 17,383. At this period it was authoritatively asserted by all concerned that only one-third of the annual crop was actually grown by the Gambian farmers, one-third being grown by the strange farmers coming into the Gambia from the Soudan, and the remaining third being nuts grown in French territory and brought into the Gambia for sale. With these views I entirely agreed after an extensive tour throughout the Protectorate, which covered the whole of the 1922-23 trading season. At this period the Gambian farmers produced a groundnut crop of 39,320 tons. In 1925-6 the crop grown in the Gambia and exported was 57,344—again excluding Saboya nuts. The strange farmers during that year fell from 17,383 to 14,652—a drop of 2,731. Owing to the higher prices paid in Senegal throughout this season and the depressing effect of the participation scheme among the local merchants upon the Gambia groundnut trade, it is an admitted fact that while practically no French groundnuts came into the Gambia considerable quantities of Gambian grown nuts were taken over the border and were sold in French territory. At Saboya alone the French exported during this season 3,728 tons, as compared with 1,642 tons in 1924. We may therefore reasonably assume that the quantity of French grown nuts coming in to the Gambia did not equal in quantity the Gambia grown nuts which went into French territory.

In 1925-6 the Gambian farmers, with the help of the strange farmers —2,731 less than in 1923-4—produced a groundnut crop of at least 57,344 tons, as compared with 39,320 tons in 1923-4.

This increase is in no measure due to less attention having been paid to other crops, such as rice and corn, as during the last two years increased attention has been paid to food crops, with the result that the corn crops harvested in 1926-7 were reported as being "wonderful" and of a size hardly ever having been seen in the Gambia before.

These results clearly indicate that, notwithstanding the falling off in the numbers of strange farmers and the adverse effect of the ever encircling French railways, the Gambian farmer has received an encouraging stimulus from the increased attention paid by Government to agricultural matters, and they are rising to the occasion and responding to the efforts being made by the agricultural officers in their behalf. If this general move can be maintained, we shall soon overcome the adverse effect of the French railways on our trade. The groundnut crop grown in 1926 is now being purchased and exported, and I estimate the crop to be in the neighbourhood of 65,000 tons.

Adulteration.

Progress is also shown during the last few years in the direction of purity. In 1923-4 the crop showed an adulteration of 8·178 per cent. In the last few years this has been very considerably reduced and in some cargoes to less than 1 per cent. In this respect the following comparison of cargoes will be of interest:—

	1923-4.	1926-7.
Total Allowance,	10·95 per cent.	2·08 per cent.

This has been brought about by compulsory screening.

Quality

Considerable progress has been made in the direction of quality, as shown by the certified Free Fatty Acid content of the Gambia crop. In 1923-4 this averaged 4·75 per cent., and reached a maximum of 12·5 per cent. This has been reduced to an average of 1·05 per cent., the maximum being 1·70 per cent. and the minimum ·77 per cent., as against the average of 1·3 per cent. for groundnuts shipped from Senegal over the same period. This improvement is almost entirely due to the extra care now being taken in selecting seed at the time of sowing. The great importance of seed selection was impressed upon the farmers at all the early meetings held in the Protectorate by the officers of this Department and it is being constantly brought forward as a matter of the greatest importance. From the foregoing it is evident that the Gambian farmers are showing a much more active and practical interest in agriculture generally; it is true that some are still only sitting up and taking notice, but others have got a move on in the right direction, and the co-operation of the merchants is required if we are to develope this movement into a flood tide.

Competition versus Participation.

The former participation scheme in operation among the merchants by which the total groundnut crop was more or less pooled and prices fixed on a uniform basis had a most depressing effect upon the groundnut industry in particular and the trade of the Colony generally. Many of the former busy trading centres resembled villages in mourning rather than the former prosperous and happy districts with beating drums. Thanks to outside competition participation came to an end and the 1926-7 buying season opened with a very strong spirit of competition. Competition is the life blood of industry; trade may be maintained without it, but never increased. First profits may be, and often are, smaller under competition, but the increased volume of trade which it invariably brings more than compensates, and the trade of the Gambia is no exception to this rule. With open and free competition on the part of the merchants and maintained effort on the part of the Gambian farmers, backed by the efforts of the Government through its agricultural officers, I think we may look forward with confidence to a more prosperous Gambia.

PRODUCE INSPECTION.

The buying season 1926-7 proved by far the most difficult and trying season that has so far been experienced by this Department, and its close came as a relief to every officer concerned. A useful purpose will be served if a few of the more important difficulties are set forth for general information, so that the position may be more clearly understood.

The African Trade Section of the Incorporated Chamber of Commerce of Liverpool drew the attention of the Government to the need for legislation on the subject of the adulteration of groundnuts being exported from the Gambia, and this resulted in the passing of "The Adulteration of Produce Ordinance, 1924," and its subsequent amendments. More recently the "Imperial Economic Committee on Marketing and Preparing for Market of Foodstuffs Produced within the Empire" have drawn attention to the necessity of maintaining a high standard of purity in all produce arriving at European ports from overseas parts of the Empire. Further, it is also the desire of the Directors of the firms operating in the Gambia that only clean produce should be bought and shipped. The Department of Agriculture is responsible for seeing that the provisions of the "Adulteration of Produce

Ordinance" are carried out, and it is the duty of this Department to safeguard, as far as possible, the interests of the Principals of the firms concerned in this direction, and to see that the trade of the Colony is not adversely affected by the action of a few in exporting adulterated produce.

It was hoped that compulsory screening would have effectually done away with adulteration without requiring the constant presence and supervision of the officers of this Department. Formerly, it was generally believed that it was the producer who adulterated his crop, but compulsory screening has entirely vindicated the farmers and proved that it is the native traders employed by the firms who are responsible for unclean or adulterated produce. So long as they are willing to buy unclean produce and continue as at present to take every opportunity of evading the Ordinance, we cannot hope for the present difficulties to be removed.

In cases where there has been proper supervision on the part of the firm there has been no difficulty either to this Department or to the firm concerned, but where there has been lack of supervision, and indifference on the part of the firm, the difficulties have been rendered acute.

During the previous buying season, it was decided that no groundnuts could be purchased for export unless they were screened *at the time of purchase.* At a meeting between the Government and the Chamber of Commerce it was explained that anyone found purchasing groundnuts either by bushel measure, or scale, without screening at the time, would be prosecuted. Permission had been given by some of the Travelling Commissioners to a number of traders to buy without screening, and this was stopped. These Commissioners held the view that it was not illegal to buy unscreened nuts so long as they were eventually screened either by the person buying or someone else before they were exported. This view was supported by the Legal Adviser. Under these circumstances it was obviously a waste of time for the officers of this Department to attempt to control adulteration before the produce reached the wharf towns, as was done formerly. It was attempted, but whenever a trader was found with unscreened nuts, his invariable reply was to the effect that he was only buying for someone else, who would screen the nuts when they reached the wharf town.

When the present buying season opened, it was made generally known that there would be very keen and open competition between all the firms, as it had been decided to do away with the participation scheme which had been in force for a year or two, and under which the various firms pooled the crop purchased.

The buying season 1926-7 therefore opened with a very strong spirit of rivalry among the competing firms, and the Government was anxious that nothing should be done which was calculated to check groundnuts coming in from French country, as the rate of exchange was in our favour, and also the prices offered for groundnuts locally was much in advance of Senegal prices.

Many traders and sub-traders were established in the Kombo district —and elsewhere in the Protectorate—buying unscreened nuts for various firms. Under these conditions the only effective way of preventing unclean, or adulterated produce, being exported, was to concentrate the Inspectors along the river front at the various wharf towns.

All officers of this Department—European and African—were detailed for this work, and were kept fully occupied throughout the buying season. Every effort was made to carry out these unpleasant duties with as little friction as possible, but I regret having to record that many cases occurred of

traders buying unscreened nuts and covering them with cleaned produce in the temporary absences of the Inspectors.

The Inspectors, having in some cases a river front of over forty miles to patrol, it was comparatively easy for traders so disposed to resort to this practice, and the fact that they were compelled to rescreen their heaps when detected did not prevent them from continuing the practice in the hope that they would, sooner or later, get through with it and so help to make up for any shortages. The fact that these traders were receiving a commission on the tonnage purchased, in addition to their salaries, encouraged them to increase their tonnage by adding sand.

Moreover, the cost of rescreening a ton of nuts is 2s. A ton of sand in a heap of groundnuts was worth £9 to £11 to the trader if he got away with it. It was a promising gamble.

The difficulties in controlling this adulteration may be appreciated when it is realised that the thirteen inspectors—three Europeans and ten Africans —had to cover an extended front of approximately three hundred miles.

Produce Inspection Committee.

In an attempt to meet some of the obvious difficulties in connection with produce inspection the Bathurst Chamber of Commerce were invited to agree to the suggestion of the Director of Agriculture that whenever the necessity of an order to rescreen should be disputed by a firm the Director should be allowed to call upon any two members of the Chamber to form with him a committee for the purpose of deciding what action should be taken. The Chamber of Commerce agreed to this proposal, but as no such dispute arose in Bathurst the services of this Committee were not called for.

On one occasion, however, an Agent of a Bathurst firm, upon receiving a wireless message from his assistant in charge of a river station, one hundred and fifty miles up river, reporting that he had been ordered by an European Inspector to rescreen 200 tons of groundnuts, the residue of 1,000 tons, strongly protested that the order was not necessary—although he had not seen the nuts—and that the inspectors were going too far in their desire for clean produce.

Arrangements were immediately made for another European officer of this Department to proceed up river with the President of the Bathurst Chamber of Commerce, who, with the European in charge of another firm, were to form a Committee for the purpose of inspecting the nuts in question and reporting upon the action of the Inspector.

Within two days the Committee reported that they were unanimous in supporting the action of the Inspector as the nuts were " very dirty."

Trade Allowance.

On groundnut cargoes arriving in Europe an allowance of 2 per cent. to cover "Dust," "Excess Shell" and "Foreign Matter" is allowed to the *seller*, anything above 2 per cent. is allowed to the *buyer*. "Foreign Matter" includes "anything not groundnuts."

Some of the local merchants are of opinion that they should be allowed to adulterate their cargoes up to this percentage. This is not a practical suggestion, for while it is comparatively easy accurately to ascertain the percentage of "Foreign Matter" contained in a cargo as it is being unloaded, the same methods would not be satisfactory if carried out while the ship was

loading. If this were attempted and the percentage of adulteration proved to exceed the 2 per cent., is it intended that the ship should be unloaded to remove the excess?

A groundnut stack varying in size from 50 to 2,000 tons is not evenly adulterated. sections of such stacks may, and often do, contain less than ½ per cent. of impurities while other sections of the same stack may contain 8 to 10 per cent. adulteration. To ascertain, therefore, the percentage of "Foreign Matter" one would have to treat the whole stack. The core of a large stack of groundnuts often contains 5 to 8 per cent. of "Foreign Matter." For these reasons no standard of purity is recognised locally and the inspectors only demand *reasonably clean nuts*. The analyses now being received of the cargoes shipped during the 1926-7 season show how efficient and accurate the judgment of the Inspectors has been.

The following are the certified analyses of the first eight cargoes of groundnuts shipped from the Gambia during the 1926-7 crop, these being the total received up to the time of writing. From these it will be seen that the average percentage of adulteration is as near the 2 per cent. allowed by the trade as it is humanly possible to get, and proves that, notwithstanding all the adverse criticisms made by th local merchants against tne Inspectors during the buying season, that these officers could hardly have been more efficient in their duties.

FIXED TRADE ALLOWANCE.

2 per cent.

Cargo No.	Dust. Per cent.	Foreign Matter. Per cent.	Excess Shell. Per cent.	Total Allowance for Admixture.
1	0·556	0·849	0·433	1·838
2	0·693	1·092	0·833	2·618
3	0·060	0·870	0·520	1·450
4	0·540	0·830	0·253	1·623
5	0·758	1·133	0·391	2·282
6	0·100	1·341	0·374	1·815
7	0·780	0·891	0·479	2·150
8	0·556	1·211	0·402	2·169
9	0·891	1·210	0·212	2·313
Totals ...	4·934	9·427	3·897	18·258
Average ...	0·549	1·047	0·433	2·029

LOADING OF STEAMERS.

In many instances the labourers employed in loading steamers are not properly supervised and officers of this Department have frequently been compelled to stop them shovelling up sand with the nuts when filling the bags for conveyance on board.

It is also a very common practice for the labourers to sweep all nuts scattered during the loading back on to the main heap together with all the loose sand, and instances of this have frequently occurred in the presence of the European in charge without rebuke. So long as this practice continues it is useless to compel the traders or farmers to clean the nuts before they arrive at the wharf towns, and even then it is of little value if indiscriminate shovelling of sand and sweepings is to be permitted at the time of loading.

If it were not for the fact that Gambia produce as a whole would suffer I should be inclined to recommend the entire withdrawal of produce inspection so far as this Department is concerned. The Principals of the firms desire clean produce and they have been to the expense of supplying their Agents in the Gambia with the necessary rotary screens to enable them to buy and ship clean produce, and they should be able to fulfil the wishes of their Principals without any interference on the part of the agricultural officers.

Such withdrawal of inspection would, however, react adversely upon the whole trade of the Gambia, as no doubt the former discount of 30s. per ton which was formerly imposed on Gambia groundnuts, and which has been reduced to 2s. 6d., would again operate, and in this way every firm would unfortunately suffer for the misdeeds of a few. One or two firms have established and maintained efficient control with excellent results and with very little assistance on the part of this Department, it would therefore be unjust to these firms to permit their good work to be ruined by the negligence of other firms.

It is obvious, however, that some relief must be afforded this Department as other work has been entirely held up by the necessity of having to watch so closely the interests of the groundnut industry in this direction.

At present the Inspectors are being condemned by the employees of the firms if they insist upon unclean groundnuts being rescreened and are accused of negligence by the same persons if a cargo reaches a transit station dirty. It is hoped that the Directors of the firms concerned will give due consideration to the points raised with a view to rendering the duties of the Inspectors less difficult.

Conditions in 1923-4.

For the benefit of those who desire to see compulsory screening abolished and for those local Managers who officially complain that their percentage of adulteration in 1926-7 was below the 2 per cent. allowance and who draw attention to their alleged financial losses on this account, I publish the following relating to the Gambia crop of 1923-4, when this Department came into operation and when a system of Produce Inspection *without screening* was in force.

Certified Analysis of Two Cargoes of Groundnuts shipped to Europe from Gambia in 1923-4.

Cargo No. 1.	Per cent.	Cargo No. 2.	Per cent.
Dust	1·736	Dust	1·213
Foreign Matter ...	1·300	Foreign Matter ...	1·050
Excess Shell ...	0·816	Excess Shell ...	1·154
Bad Kernels ...	4·056	Bad Kernels ...	3·743
Special Allowance	3·042	Special Allowance	2·807
Total ...	10·950	Total ...	9·967

These are not exceptional cargoes but fairly represent the condition of the crops at that period. The adulteration in some cargoes reached as high as 17·53 per cent.

Financial Loss.

Shipments made in 1923-4 averaged for the crops 8·175 per cent. adulteration. The total crop exported was 60,622 tons, and the average price obtained was £15 per ton. The total value of the crop was therefore

£909,330, of which 8 per cent. represented an actual financial loss of £72,744 to the eight firms engaged in this trade. This represents the *purchasers* side of the question.

The following extracts taken from letters received show what the *buyers* in Europe thought of Gambia produce at the time. The Management of one of the most important Huileries in Europe wrote as follows :—

> "Gambia nuts are giving this year oil containing 4·75 per cent. acidity when the nuts from Senegal gives only 0·7 per cent. Such degree of acidity necessitates some very expensive operations to make oils, which are never as good as those made with groundnuts in Senegal."

Another large buyer of Gambia groundnuts wrote: "It requires a certain amount of audacity for a firm to sell such a poor quality of groundnuts."

Another letter reads as follows :—

> "We are sending you to-day *ex* the above parcel of sample to enable you to show sellers how extraordinary badly they have served us, and that it is not in order to ship such really miserable goods to us."

In view of the foregoing, it is amazing that anyone interested in the prosperity of the firms who employ them or in the general advancement of the trade of the Colony should desire the abolition of compulsory screening and a return to the conditions of 1923-4.

Prosecutions under the Adulteration of Produce Ordinance.

Instructions were given to all Produce Inspectors before they took up their stations in the Protectorate that no prosecutions were to be made against any buyers of groundnuts until every other effort had proved ineffectual.

I regret, however, that we were compelled to prosecute in six instances after repeated warnings had been given.

Case.	District.	Charge.	Result.
1	Dasalami	Buying unscreened nuts	Fined £5.
2	Basse	Using screen in such a manner as to render it inefficient.	Fined £5.
3	Basse	Storing for export unscreened nuts	Dismissed.
4	Fattatenda... ...	Buying unscreened nuts	Fined £10.
5	Fattatenda... ...	Refusing to rescreen nuts	Fined £20.
6	Balingho	Refusing to rescreen nuts	Fined £12.

STRANGE FARMERS.

A still further drop in the number of immigrant farmers visiting the Gambia to grow groundnuts has, unfortunately, again to be recorded. The falling off in numbers is even much greater than that shown by the actual figures, for whereas in former years these figures represented only those farmers coming in to the Gambia from Senegal, the Cassamanse and Portuguese Guinea—chiefly Bambarras and Manswonkos—they now include all

Gambian farmers who have moved from one province to another within the Gambia. In some provinces these represent at least fifty per cent. of those officially recorded as Strange Farmers.

The young farmer of to-day appears less inclined to remain in his native town or village during the planting season, but prefers to farm land—if at all—beyond the range of paternal control.

The Gambia—as stated in my Annual Report for 1925—is becoming less and less attractive to the immigrant farmer in comparison with Senegal. The chief cause is undoubtedly the opening up of French territory with railways which provide better facilities for the transport of produce from the farms to the buying centres.

The following table shows the distribution of the Strange Farmers in the Protectorate :—

Distribution of Strange Farmers, 1926.

Province.	Average per Annum for Previous Five Years.	Actual Numbers.		Decrease.	Increase.
		Year 1925.	Year 1926.		
Upper River	4,713	4,977	5,389	—	412
McCarthy Island ...	2,245	1,671	1,068	603	—
South Bank	5,260	4,139	3,470	669	—
North Bank	1,909	1,731	1,253	478	—
Kombo and Fogni ...	1,869	2,134	2,373	—	239
Totals	15,996	14,652	13,553	1,750	651

This shows a further loss of 1,099 during the year under review. It is hoped that the scheme for the annual distribution of seed groundnuts at the time of sowing will not only check this falling off but that many strange farmers may be again attracted.

From Chart 1 of this report it will be seen that the average number of Strange Farmers for the last three years was 14,131, being 5,868 below the average for the preceding three years.

CHIEF AGRICULTURAL EXPORTS.

Groundnuts.

Date of Opening and Buying Season for Groundnuts.

The question of opening the buying season in November instead of December 1st was again raised, but it was decided that it would be unwise to make any change. The crop is not reaped until the end of October or November, and to open the buying season before December would enable the farmers to sell their nuts before they were properly dried. This would lead to a shortage in weight after purchase owing to the evaporation of moisture. The greatest harm would, however, be the increased Free Fatty Acid Content of the nuts which would result from stacking large quantities of beaten nuts in bulk before they were sufficiently dried. Another very important reason why the opening date of the buying season should not be changed is that the natives can only clean their nuts by winnowing. For this operation they are dependent upon the N.E. Trade Winds, which do not

commence to blow until the end of November or early in December. These factors more than outweigh any advantages which may, or may not, be gained by advancing the buying season.

Prices Paid Locally.

The prices opened at 2s. 1½d. to 2s. 3d. per bushel, but owing to keen competition among the merchants the prices varied and fluctuated daily. At the close of the season—but unfortunately for the farmer—after practically all the crop had been purchased, the price rose to 3s. and 3s. 6d. per bushel in an attempt to obtain further supplies to complete contracts already made. The average price actually paid to the native farmer was between 2s. 6d. to 2s. 7d. per bushel, *i.e.*, £10 to £10. 6s. 8d. The higher price paid at the end of the season will undoubtedly have its effect upon the next buying season, as the farmers will anticipate a similar action on the part of the merchants and will hold their crop as long as possible in the hope of reaping higher prices.

Crop 1925-6.

The estimated crop for 1925-6 was given as between 58,000 to 60,000 tons. The total crop exported was 61,072 tons; of this quantity, 3,728 tons were exported from Saboya. A large percentage of the nuts shipped from Saboya are Gambian grown.

Traders at Saboya are in a better position to offer higher prices than Gambian traders a little lower down the creek, as the export duty levied by the Gambian Customs on Saboya nuts is 1s. per ton as against 20s. per ton levied on Gambia nuts. For this reason it pays the Gambian farmer living within easy reach of Saboya to convey his nuts to that wharf for sale.

From the following figures it will be seen that the groundnut exports from Saboya through the Gambia are increasing :—

	Exports.		
	Tons.	Tons.	Tons.
Groundnuts :—	1924.	1925.	1926.
ex-Bathurst ...	58,980	46,583	57,344
ex-Saboya ...	1,642	2,117	3,728
Total ...	60,622	48,700	61,072

I am of the opinion that this increase in Saboya nuts is mainly due to Gambian nuts being taken to Saboya for sale and is in a measure the result of participation which operated in recent years. During the present season (1927) conditions have been more favourable in the Gambia, and I anticipate that when the final figures are available at the close of the season we shall probably find that Saboya has not maintained this steady annual increase and, if this is the case, some action should be taken to prevent Gambia nuts going to Saboya.

Crop 1926-7.

Although the exportation of the present crop will not have been actually completed before this report is closed, there is every indication that the total will exceed 60,000 tons and should be in the neighbourhood of 65,000

Variation in Weight of Groundnuts.

The nuts varied in weight from 23½ lbs. per cut bushed to 28½ lbs., and from tests made it would appear that this variation was largely due to the uneven distribution of the rainfall, as a close relationship between the two is observed.

During this season the districts with the heaviest rainfall produced the heaviest nuts.

A point, however, may be reached where increased rainfall would bring about just the opposite results by increasing the growth of fungi and so adversely affecting the development of the nut, resulting in an "Excess of Shell," which is penalised above 25 per cent. of the entire nut. Extreme variations were met with at Banna Tenda where the average cut bushel weighed 23½ lbs. and at Koina where the average was 28½ lbs.

Motor Transport.

The buying season 1927 was unique in that it witnessed a change from donkey to motor lorry transport. Lorries operated for the first time in many of the up-river districts and tremendously increased the spirit of competition. With lorries tearing about the bush and all manner of craft, from a native canoe to an ocean-going steamer, moving about the river, the Gambia became transformed. The increased quantity of groundnuts bought during the first two months of the season led merchants generally to believe that the crop was going to be exceptionally good. As the season continued, however, it was soon discovered that it was also going to be a short season, and instead of being prolonged over five to six months as formerly the employment of motor lorries had reduced the actual trading season by several weeks.

This shortened season may therefore not be in the best interests of the trade generally.

Quality of 1927 Crop.

The quality of the 1927 crop shows a still further improvement upon previous crops since the establishment of the Agricultural Department in 1924. The following figures are the averages taken from the official certificates of analyses supplied by the firms to this Department.

Crop.	Excess Shell.	Bad or Damaged Kernels.	Free Fatty Acid.
1923-4	1·390	2·468	4·75
1924-5	·634	·670	1·59
1925-6	·953	1·146	1·75
1926-7	·469	·542	0·60

PROVINCIAL SEED FARMS AND DEPOTS.

(Submitted by Mr. C. W. Line, Assistant Director.)

Twelve seed farms and depôts were established this year. Each farm consists of ten acres of land, and a strong galvanised iron building which is rat proof and capable of holding a hundred tons of groundnut seed.

The farms are situated as follows :—

Upper River Province—Fattoto, Wuli and Basse.
McCarthy Island Province—Lamin Koto, Kuntaur and Kaur.
South Bank Province—Bansang, Kudang and Soma.
Kombo and Fogni Province—Kansala and Sukuta.
North Bank Province—Kerewan.

Objects.

The farms are to be used as agricultural training centres for the districts they serve. Field trials will be conducted of strains of groundnuts which have been raised at the Agricultural Headquarters, Cape St.

Mary. After a final test in the district the most suitable varieties will be issued to the native farmers for general cultivation.

These trials should prove of great interest as the localities in which the farms are situated vary considerably. The farms at Fattoto and Bansang are on very dry land, lying as they do at the base of iron-stone ridges. In the other extreme are the farms of Lamin Koto and Kau-ur, which are situated on the margin of swamps. The soil also varies and there is considerable difference in the rainfall. Beside these there are many factors at work of which little is known at present. When their effect is determined it is quite likely that certain varieties of groundnuts will be shown to be particularly suitable for certain districts.

Other economic crops will be grown and the best method of cultivation explained. When it is realised that in some districts there are no fruit trees and scarcely any vegetables, the importance of this will be quickly appreciated.

It should be understood, however, that there must be a continuous supply of suitable plants. The natives have not been accustomed to fruit and vegetables and the demand will only come as the taste is acquired. It would be useless to expect that one issue will be sufficient. The natives will have to see the plants cultivated and it must be brought home to them that the plants are worth the trouble involved in their cultivation.

Each farm is a rain recording station and will enable accurate information to be obtained as to the annual distribution in the Protectorate.

Overseers.

The appointment of twelve suitable overseers for the farms has proved a most difficult problem. The only available candidates were men of the "Clerk" type, and with these a start was made. Unfortunately many of the overseers did not show much aptitude for their work. Education of the native seems to unfit him for manual work, and it is essential that an agricultural overseer should be able at least to demonstrate simple gardening methods to his labourers. Another and even more serious aspect is the mutual distrust evinced by the clerk and the local native. This can be easily understood when it is remembered that their previous intercourse has been at the buying centres along the river. There the clerk has done his best to make a good bargain for himself and his master and the bush native has been the loser. The native farmer is convinced that as far as farming is concerned he can learn nothing from the clerk.

This lack of understanding between overseer and native has been a severe handicap during the first year's working of the farms, but as the agricultural officers became better acquainted with the local inhabitants it was found possible to select a number of natives to replace the less satisfactory of the overseers. The native farmer lacks education, but he is not afraid of work and he has the confidence of the natives of his district. It is hoped that he may prove a suitable medium for the spread of agricultural knowledge.

Transport.

The planting season in the Gambia is very short, and it is absolutely necessary if good crops are to be obtained that all field operations should be carried out at the right period. To ensure this it is necessary that rapid and frequent visits should be made to each farm by a competent officer throughout the growing season. With twelve farms scattered over a distance

of three hundred miles it is essential that quick transport facilities should be available. To meet this necessity a motor launch was ordered in 1925 in the belief that its services would have been available in 1926 for this particular work. Unfortunately this launch was not delivered until March, 1927, and the officers being left without the necessary means of transport were unable to give the necessary supervision to the seed farms and the work seriously suffered in consequence. A certain amount of valuable information has, however, been recorded in connection with diseases and the suitability of the various varieties. Labour difficulties were increased by our inability to visit the farms to pay the labourers.

Labour.

During the year two methods were employed. At the farms, where the overseers were completely new to their duties, contracts were placed with responsible native farmers to carry out the work. It was hoped that with supervision the new overseers would gradually pick up their duties.

This method on the whole has many disadvantages. The natives take no interest in their work and attempt to complete their task as rapidly as possible. The work is scamped and the final results leave much to be desired. Contract work is often carried out, only after the contractor's own farm is finished, and with such a short growing season this has a serious effect on the yield.

The other method adopted and one that will be employed in future, is to engage a permanent staff. Where the overseer has experience, and is liked, satisfactory results should ensure. The main handicap in dealing with hired labour is the lack of that plodding application which is so necessary in a wage earner. Natives will work extremely hard at times, but they then like to slack off. Good native farmers take a pride or at any rate an interest in their farm and will be found constantly weeding and resowing where gaps have occurred. This interest, however, completely evaporates as soon as he is asked to work on another farm. He seems to be singularly lacking in the ability for sustained effort, and it will be one of our first tasks to attempt to train a staff of satisfactory labourers.

Methods of Cultivation.

In order that the experiments might approach as closely as possible to the native farms, the Mandingo method of cultivation was adopted.

After the farms had been cleared of bush the land was ridged by the native hand-plough. The groundnuts were sown on the ridges 18 inches apart. In about a month the farms were weeded and weeding was repeated at monthly intervals. In the majority of cases three weedings were found to be sufficient, but on two farms a fourth was found necessary. Reaping was carried out by the Mandingo plough, or where the ground was hard, by a special native hoe. After a few days of drying, the unbeaten vines were stacked on raised platforms and beating was carried out later when the help of the " Harmattan " could be relied on to assist in winnowing.

Variety Trials.

The following seven strains of groundnuts were tested at the seed farms :

" Gambian," " Basse," " Zaria," " Philippine Pink," " Philippine White," " Senegal," and " Mauritius."

The Gambian variety is a strain grown at Headquarters for the last two years from a selection of the best local seed. It is a spreading variety and covers about a square yard when fully grown.

"Basse." This seed was selected by the Director in 1923 at Basse. It was grown locally under the supervision of the Travelling Commissioner, Upper River Province, until the Agricultural Station was established, since when it has been propagated at Headquarters. This is similar in habit to the Gambian variety.

"Zaria." This seed comes from the Zaria district of Nigeria and resembles the Gambian variety.

"Philippine Pink." This was imported from the Philippine Islands. It is an upright growing variety. The nuts are clustered round the base of the plant, which considerably facilitates reaping.

"Philippine White." This variety has been obtained at Headquarters from the Philippine Pink. The vines creep instead of being upright like their parents and the kernels are covered with a white instead of the usual pink skin.

"Senegal." This variety was obtained from the Cayor district of Senegal. It is a spreading variety, but it does not produce the abundant vine of the Gambian. The leaves are also smaller. Its main attraction is the small amount of shell, and it weighs 29 to 30 lbs. per the cut bushel.

"Mauritius." This nut, as its name indicates, came from Mauritius. It is a creeping variety, but has a more straggling appearance than the Gambian. The kernel is covered by a copper coloured skin.

Diseases.

"Leaf Spot." The majority of the farms had little disease. Leaf spot was present but did not seriously harm the crops. All varieties showed considerable resistance but none immunity. "Philippine Pink" appeared to be heavily infested but nevertheless produced excellent nuts.

"Rosette Disease." There was an outbreak of rosette disease at the Lamin Koto farm. All varieties showed equal susceptibility. It was eradicated by the ruthless weeding out of all affected plants, and this seems to be the most satisfactory method of control. Natives are being instructed to pull up infected plants on the first appearance of the disease. Even when only the tips of the leaves are attacked the plants should be removed, as the disease may be quickly spread by insects from plant to plant. Rosette disease also appeared on a few plants on the Kudang farm, but on their removal the rest remained healthy. Early sowing is recommended, as it is always the late sown plants that are the more seriously damaged.

No other diseases were recorded.

Other Pests.

"White Ants" did considerable damage to the groundnut plants and wiped out the sugar cane on several farms. Monkeys, Wart Hogs, Squirrels, and Bush Fowls were troublesome at times.

Results.

The season 1926 was unfortunate in regard to rainfall. The total quantity was sufficient, but the distribution was unsatisfactory. There were three periods of drought, one in June of 15 days' duration, one in

July of 10 days and one in August of 7 days. These dry periods had a serious effect on the crop. In many cases replanting after the first drought had to be undertaken on an extensive scale and this adversely affected the yields. This was most remarked in the Fattoto area. There, according to records, the rainfall was heavier than in other parts of the river, but, no doubt, owing to the lower humidity of the atmosphere and the porous nature of the soil the plants seemed to be more susceptible to drought. The opinion of several old farmers with whom the matter was discussed was that the yields are lower by 25 per cent. to 50 per cent. than during normal years.

The Government farms suffered like the rest and the yields are smaller than they should be in a more normal year.

Varietal Experiments.

"Philippine White," "Gambian," "Basse," and "Zaria" varieties gave consistently the best results, and of those the most promising as a new variety is the "Philippine White."

"Senegal" was disappointing except at Wuli and Fattoto, where further tests will be carried out.

"Philippine Pink" was heavily infected by "Leaf spot," but produced such good nuts that further trials are to be made. It has been decided that this variety is not suitable for ridge planting, and it will in future be planted on the flat and much closer together.

"Mauritius" was practically wiped out by the first drought, and it is impossible to report on the remaining plants.

The main work accomplished during the year was cleaning and planting the farms, and too much reliance must not be placed on the results of the trials. The overseers were new to their work and the lack of transport made efficient supervision impossible, also observation on the various strains of groundnuts were not enough to justify definite conclusions being arrived at. These conclusions will have to be confirmed by further tests, as in farming there are so many factors at work that the results of one year may be considerably modified in the following, and it is only on a series of experiments that definite conclusions can be made. The native farmer is very conservative, and if any advice which was given him, proved on more mature experience inaccurate, incalculable harm would be done, and his confidence, which is very difficult to obtain, would be shattered once and for all.

Economic Plants.

In the majority of the farms small experimental plots of limes, guavas, bananas, pawpaws, sugar cane, calabash trees, and Pitanga cherries have been established.

A large issue of lime plants have been made and some mangoes, calabash trees, and sugar cane have been distributed to the surrounding districts.

All these plants are doing well with the exception of the sugar cane, which has not been everywhere successful owing to the ravages of the "white ants." Further supplies of plants will be available for the natives who may require them in the coming rains. The thanks of the Department are due to the Travelling Commissioner, McCarthy Island Province, the Travelling Commissioner, Upper River Province, and the Protectorate Medical Officer for the kind assistance they rendered in transport with launches when opportunity occurred.

Buildings and Fencing.

The depôts are galvanised iron buildings, with steel frames, iron doors and concrete floors. Each building will conveniently hold 2,500 four-bushel bags of groundnuts stacked in such a manner as to permit free circulation of air. The ventilation originally provided has proved satisfactory, even when the buildings have been filled to their maximum capacity and when the outside temperature has been 106° in the shade.

The total cost of each, including transport and erection, was £386. Each ten acres of land is enclosed with " Hercules " iron fencing provided with two nine feet iron gates, the total cost being £172 for each farm.

GOVERNMENT GROUNDNUT SEED SUPPLY AND DEPOT SCHEME.

This scheme—the details of which were published in the Annual Report of this Department for 1925—has received the approval of the Secretary of State and will come into operation for the first time during the present year.

Arrangements are well in hand for the distribution of selected seed on a large scale in May, just previous to the rains.

It was hoped that it would have been possible for 1,000 tons of groundnut seed to have been distributed this season, but in view of the fact that during the last two or three years the farmers have been taught thrift and to select and save their own seed in their native stores, the demand for extra seed is not as great as would otherwise have been the case.

After consultations with the Travelling Commissioners, the following provision has been made by this Department to meet their requirements :—

Upper River Province ..	6,000	(Four Bushel Bags)
McCarthy Island Province..	3,600	„ „ „
South Bank Province ..	5,000	„ „ „
Kombo and Fogni Province..	200	„ „ „
North Bank Province ..	50	„ „ „
Total ..	14,850	

Thanks to the willing co-operation of the mercantile firms, it has been possible for this seed to be selected by the officers of this Department at the various buying centres throughout the Protectorate. When specially fine seed was observed at any buying station, a wireless telegram was received from the officer concerned and steps were at once taken to secure the seed through the Bathurst firm concerned. Owing to the higher prices paid locally this season for groundnuts, it was not possible to obtain the seed at £10 per ton, as was hoped for. The 740 tons required have, however, been supplied proportionately by the Bathurst firms at the uniform and reasonable price of £11 per ton.

The bulk of this seed is already stored in the various Government depôts throughout the Protectorate in readiness for distribution about the middle of May. This procedure has the advantage of convincing the farmer some few months before sowing time that he will be able to obtain a full supply of seed both for himself and any strange farmers who may wish to work for him during the coming season.

I desire to thank the merchants for their ready co-operation in this matter and to express the wish that increased trade may follow these efforts.

GENERAL AGRICULTURE AND NATIVE CROPS.

The following brief reports relating to native crops have been received from the travelling commissioners :—

North Bank Province.

Nuts good and average a heavier weight than is usual in this Province, and certainly much better than last year's, probably larger, but very light-weight crop. This season even Lower Baddibu, always notorious for light nuts, has quite decent ones this year. Much better, however, are the Senegal nuts, those grown within, say, 15 miles of the border, where apparently this year all the best Senegal nuts have been grown, and not further north, as is usual, owing to the very short rainfall in that area. It is these excellent nuts we have got in quantity at Jowara and elsewhere, and one can actually see the difference between these nuts and our own, for the French ones are so much cleaner and brighter, coming, as they do, from a soil which does not cling so much to the nuts when pulled, as does our more clayey stuff, mostly alluvium, I believe. In weight, however, there is not much to choose between them, for we have plenty of our nuts this year weighing 27 to 28 lbs. to the bushel. As regards quantity, I think we have had about as many nuts, or nearly as many, as last year, but feel sure that the total output of the Province will be much larger, owing to the large quantity of French nuts we have bought; we have certainly had our third (probably more) of nuts grown on French ground, but unfortunately nothing like the third grown by Frenchmen on our ground. That, as everything points to large numbers of Strange Farmers next rains, we may perhaps also get.

Rice.—A failure everywhere except in Sanjal (the east end of Baddibu), where the crop is almost normal. This due, of course, to the short rainfall, which evidently (as has often been found before) just suited the nuts and millets, but was not enough for the rice. In the Niumis and Jokadus the failure was complete, in Baddibu (except Sanjal as above) partial, the crop varying from nine-tenths to half a crop, according to locality, with complete failure in places, that is, the drier ones.

Corns.—The small millets, excellent everywhere, and the Basso good where it grows, *i.e.*, in the eastern part of the Province.

Kombo and Fogni Province.

Groundnuts.—Good crop from the first and principal planting everywhere, nuts generally considered better than those of the 1925-6 season, certainly heavier in most places. Attention was practically given to a second planting only in the districts of Kombo St. Mary and Kombo North; this small crop was poor, the nuts being light and in places not worth digging; farmers ascribe failure to early cessation of rains.

Rice.—Failed everywhere except in few places where water lay; Faraba, Tujerren, and Sanian in Kombo had a little.

Corn.—Findo, largely grown in Kombo, excellent; millet and small guinea corn—early planting very fair, but not to be compared with the crop the year before; later planting suffered from insufficient rain; "leo" appeared in parts of Foni.

South Bank Province.

Groundnuts.—In several parts of the Province, notably in Western Niamina District, the late-planted groundnuts were more in evidence than usual, due to the general lateness of the rains in setting in and to the lightness of the early rainfall. The average farmer of this Province adheres

to the early planted groundnut when conditions are favourable, and the year 1926 proved no exception to this rule. On the whole, the area under cultivation of groundnuts compared favourably with that of the preceding year, in spite of the decrease of 669 "strange farmers," whose presence in the Province in a year of plentiful food, coupled with an issue of seed in May, might have been of untold benefit, and have made an appreciable difference to the crop.

Rice.—Generally speaking, the rice crops of 1926, from the earliest rices, "dinkeringo," and "tunkung," or brown rice, to the late "alieu nringo," have been far below the standard of 1925. In Central Kiang District, to all intents and purposes, the rice crop is a general failure. In all other nine Districts, hundreds of acres of rice failed to mature owing to general dryness in September and October; in fact, so parched had many of the paddy fields become, that transplanting had to be abandoned by the women in many areas.

Food Crops.—These, again, fell below the standard of 1925 in all ten Districts. "Bassi-ba," the large guinea corn, suffered somewhat from the "leo" disease in the Miaminas, while in the two Fulladu Districts, a considerable acreage of "bassi-ba-kinto," another variety of large guinea corn, failed to develop in the grain, through lack of rain or wrong disposition of rainfall. Other varieties of guinea corn also suffered through shortage of rain. Many fields of "sanyo," or late millet, contained more than the usual percentage of deformed and diseased plants, particularly in the two Fulladu Districts. The "suno," or earlier millet, did better on the whole than its later neighbours "sanyo" and "majo."

Beans, particularly in Fulladu West District, did poorly through lack of rain, and withered in considerable quantities.

Cassada was more generally grown than in preceding years.

Maize held its own both in quality and in quantity throughout the Province.

"Findo," or "findi-ba," the grass-like cereal, particularly in Eastern Kiang District, was of good quality, though not so plentiful as usual.

A recapitulation of the food crops of the Province shows that, both in quality and in quantity, the standard of the preceding year was not reached, while shortage of food may be looked for in certain areas as the dry season wears on.

Upper River Province.

Groundnuts.—From reports which I have received from the trading firms, I understand that the nuts in all the districts of the Upper River Province are of very good quality this year. This is particularly the case at Koina, in Wuli district, where the nuts weigh up to 29 lbs. to the bushel.

Owing to the three periods of protracted drought experienced during the rainy season and to the light rainfall in the months of September and October, which was only 12·3 ins., as compared with 17·1 ins. for those two months in the previous year, the actual yield of nuts grown in the Province will be light.

Rice.—Very little rice is grown in this Province. The little that was planted is in most cases a complete failure.

Food Crops.—The Kintos, Bassos, Sunos and Marjos are reported to be very good throughout the four districts.

Maize was not so successful owing to the early finish of the rains spoiling the late crop.

The total of food crops stored is most satisfactory, and there should be ample for both the inhabitants and an average number of strange farmers in the coming season.

McCarthy Island Province.

(*a*) More groundnuts were planted this year than in the previous year, with the result that the crop, though yielding less than the phenomenal year of 1925, was actually greater, reckoning per head of population. As, however, the population was less than in 1925, the actual total crop is probably approximately the same as in 1925. Many more groundnuts were, however, brought into the Province by farmers resident in Senegal.

(*b*) The reason for more groundnuts being planted was due (1) to the compulsory storage of groundnuts, combined with a sufficient issue of seed to make up deficiencies and to meet the needs of strange farmers; and (2) to the food crops being sufficient for the rainy season, whereby the farmers were enabled to concentrate on their work, without anxiety regarding their next meal, a psychologic factor of supreme importance.

The seed issued was limited to the maximum obtainable, and it was fortunate that it met all needs. But for compulsory storage, fewer bags of seednuts would have been kept, and all needs could not have been met.

(*c*) There was a remarkable absence of disease, and in only two towns did the "teo jankaro" appear to such an extent as to affect the crop to a noticeable extent. In these and a few other towns, the yield was less than last year, the shortage being due in the two cases to disease, and in others to being planted too late in the season, coupled with an early cessation of the rainy season. In a few other cases the shortage was caused by the depredations of noxious beasts.

(*d*) Although this season's crop appears to be of better quality than that of 1925-6, the Senegal groundnuts were, as a rule, of greater weight than the Gambia nuts, running nine bushels to the donkey load, as compared with eight bushels, although the bags were of the same size and filled to the same extent.

Rice.—The crop on the whole proved a failure, owing to an insufficiency of rain. Here and there the crop was better than in the previous year, but in such cases the crop would have been "drowned" had the rainfall exceeded the normal.

Foodstuffs.

Maize.—This was good in Niani, Lower Saloum and part of Sami, but failed elsewhere to a greater or lesser extent owing to the light rainfall at a critical period.

Suno and Sanyo.—These crops failed in Niani, Nianija and Upper Saloum. Little of either is grown in Sami, but they did well in Lower Saloum. The failure occurred wherever the "silo" made its appearance, except in Nianija, where the shortage of rain was the cause.

Basso and Kinto.—The kinto gave good results. Basso, however, failed in every district, owing to the early cessation of the rainy season.

General.—In every district the yield is less than was the case in 1925, being due to the reason stated above, and to damage by wild beasts. In Lower Saloum alone is there a bare sufficiency for the needs of the resident population. In Niani there is a decided shortage.

PROGRESS IN MINOR INDUSTRIES.

Palm Kernels.

A slight drop is shown in the actual exports of palm kernels during 1926, but from the figures below it will be seen that during the last three years this industry has maintained a steady average output of 684 tons, as compared with the average of 381 tons for the preceding three years.

The actual exports of palm kernels for the last six years are as follows :

Year.	Tons.	Value.
		£
1921	302	4,478
1922	450	5,731
1923	392	5,640
1924	678	10,571
1925	692	12,254
1926	676	11,293

A special officer of this Department was again employed in Bathurst throughout the year inspecting palm kernels offered for sale. The Bathurst Chamber of Commerce complained that kernels were being offered for sale in an unclean condition and requested that further action should be taken. It is not possible for this Department to render greater assistance in this matter than at present, and if members of the Chamber would refrain from buying unclean produce, the natives would very soon clean their produce to the required standard, but so long as some merchants are prepared to buy inferior and uncleaned produce, so long will the natives supply the demand, and any efforts on the part of this Department to ensure clean produce will be rendered abortive.

Hides and Skins.

The exports show a considerable falling off in the actual *number* of hides exported during 1926, but from the total weights which are given below it will be seen that the quantity was slightly above that of the preceding year. The figures for the last three years are as follows :—

Year.	Hides.	Weight. lbs.	Value. £
1924	11,628	133,965	2,454
1925	14,393	112,690	2,793
1926	9,771	113,083	2,795

Beeswax.

Special efforts have been made during the year to revive the former flourishing trade in beeswax obtained from wild bees.

Four Bathurst firms were engaged in this trade and factories equipped with boilers, strainers, presses and moulds were in operation until 1920,

when they closed down. The industry was killed by enforcing the Public Health Regulations of 1917, it not having been found practical to give effect to regulation (*b*), which orders that any person holding a certificate in respect of premises used for melting beeswax shall: "Discharge any fumes which are not consumed into the external air in such manner and direction as to admit of diffusion without any noxious or offensive odour."

The offensive odour can only have been due to the raw wax containing dead bees killed during its collection. It appears probable, therefore, that with more care on the part of the natives in preparing the wax before sale, that this industry may again be revived and built up without either reconstructing the works—which the firms are not prepared to do—or breaking the Public Health Regulation referred to. Pure samples of beeswax were prepared by this Department and used by the officers when in the Protectorate for demonstrating to the natives a simple process by which clean wax, suitable for local sale, may be obtained. One firm has offered a very favourable price for the raw wax, and it is confidently hoped that beeswax may again appear in our list of exports in the near future.

Some idea of the importance of this minor industry can be gauged from the fact that the four firms concerned actually exported in 1908-9 no less than 61,574 lbs. of beeswax. This industry was, in common with others, adversely affected by the war, and before it could again be built up the enforcing of the regulations referred to proved its death blow. Every effort should be made to re-establish this industry as early as possible.

AGRICULTURAL AND BOTANICAL STATION, CAPE SAINT MARY.

Gardens.

The area devoted to ornamental and economic plants has been considerably developed during the year and lawns and grass paths have been successfully established with Bahama grass.

A valuable collection of economic plants and palms has been made and planted out in permanent stations. The system adopted has been to plant borders and beds with permanent ornamental shrubs at suitable distances to permit of growing showy annuals between, such as zinnias, petunias, gypsophila balsams, calliopsis, celosia, coleus, cosmos, nasturtium, tobacco, phlox, portulaca, salvia and miniature sunflowers, etc. A brilliant display of colour has thus been maintained in this way throughout the year; the annuals being in flower from February to June. During the rains, and until January the Garden depends for its attractiveness entirely upon the permanent shrubs, such as crotons, hibiscus, acalypha, cannas, etc. Labour has again proved the greatest problem, as it does in all our schemes. The available material is of the most inferior and roaming. It has been hoped that within a year it would have been possible to have trained at least a few men in the simple methods of gardening, but I regret to have to record that after three years' endeavour—although having been used to handling native labour for over twenty years in other tropical colonies—it has not been possible to train one man. Even high wages will not hold them, as they prefer to drift from place to place.

Nurseries and Demonstration Plots.

The nureries have been extended and fully developed during the year, chief attention being given to economic plants and fruit trees. The permanent ornamental plants have now developed sufficiently to enable an abundance of propagating material to be obtained.

Distribution of Plants.

Special attention has been given to the raising and distribution of fruit trees as there is such a scarcity of fruit in the Colony.

During the period under review 2,748 fruit trees were distributed. These plants were in most cases thoroughly established in kerosine tins for nine to twelve months previous to distribution. The same method is followed also in the case of all economic trees. This entails a considerable amount of extra labour on the part of the nursery staff, but under Gambia conditions, with no rain for seven to eight months in the year, it is the only method by which practical and successful results can be attained. When the plants are removed from the tins into their permanent stations just before the commencement of the rains they have developed a good root system which enables them to withstand the severe conditions during the following drought. The losses by this method are less than one per cent. but the loss by white ant attack is probably three per cent.

Among the fruit plants distributed were oranges, mango, lime, pomegranate, custard apple, sour-sop, banana, guava, pawpaw, date, grapevine, cape-gooseberry, surinam cherry, sapadilla, pineapple and sugarcane.

The following table shows the number of plants, cuttings and seeds distributed from the Department's nurseries during the period under review :—

Trees.	
Economic trees	1,784
Flowering trees	290
Fruit trees	2,748
Ornamental shrubs	702
Total ...	5,524
Cuttings.—Sweet potatoes	1,600
Seeds.—Groundnuts, bushels	400

In addition to these, 437 Casuarina and other trees were planted out on the Department's farms.

PLANT AND SEED IMPORTATION.

Senegal Groundnuts.

Through the kind services of Monsieur Henry Maurel a few pounds of the three best commercial varieties of Senegal groundnuts were obtained for trial. These were "Sine," "Joal" and "Baol." These nuts are much larger in each case than the "Cayor" nut and very closely resembles the Gambian varieties. These varieties were received a little too late for reliable field trials to be conducted. Sufficient seed has, however, been raised to enable suitable trials to be conducted in the coming season.

Rhodesia Groundnuts.

The following groundnut varieties have been received from the Department of Agriculture, Southern Rhodesia :—Java White; Natal; Virginia Runner, Virgina Bunch; Valencia; Jumbo; Improved Spanish. These seven varieties will be included in our Varietal Trials in the coming season.

United States Department of Agriculture.

Through the co-operation of the Bureau of Plant Industry, Washington, it has been possible to arrange for an exchange of the principal sorghum varieties grown in the United States. Twenty-three varieties have been received and field trials will be conducted as soon as practicable. These varieties mature in the period from June to October and are drought resistant. It is hoped that from these a few new varieties may be found to prove more suited to Gambia conditions than our "Basso" variety, which owing to its large grain is so popular with the Protectorate farmers but which so often fails through Aphis attacks. Some of these varieties take only 95 to 100 days to mature in the States, and for this reason should prove extremely valuable in the Gambia, other factors being equal.

Centipede Grass (Eremochloa Ophiuroides).

Dr. Fairchild presented the Department with a small sod of Centipede grass and it is making strong growth and spreading well. This grass came from the Province of Hunan China. It is considered one of the best drought resistant lawn grasses known, it makes excellent pasture and remains green when other grasses dry up. As to its rapid growth, it is recorded that a tenth-acre plot planted in rows 3½ feet apart in 1920 was completely covered with a thick turf in 1922. The U.S. Golf Association (1925) records that centipede grass proved superior to all other grasses for lawns and fairways. It is specially suited for light sandy soils and should therefore prove valuable in the Gambia.

Bermuda Grass.

A consignment of seed of this valuable Tropical lawn grass was also obtained from the U.S.A. Department of Agriculture. Turf will be raised from this seed for planting in suitable places.

Hydnocarpus Wightiana.

Three pounds of seed of Hydnocarpus Wightiana were received from India through the British Empire Leprosy Relief Association with a view to this species being grown in the Gambia to supply a cheap local source of Chaulmoogra nuts, which are being successfully used in the treatment of leprosy. Some fifty strong plants have been raised from this seed which it is proposed to plant out at the Government seed farms in the Protectorate. In this way we shall ascertain the most suitable Province for its cultivation.

FIELD EXPERIMENTS AT THE AGRICULTURAL AND BOTANICAL STATION.

Sesameseed (*Sesamum indicum*).

In 1925 some attention was given to the cultivation of the seasameseed imported from Sierra Leone with a view to introducing it for general cultivation in the Gambia if it proved a suitable crop. Further efforts in this direction enabled us to obtain small quantities of the five best varieties known to commence. Through the kindness of Monsieur H. Maurel, of Messrs. Maurel Freres, Bordeaux, to whom the thanks of this Department are due, we received a parcel of each of the following varieties:—No. 1, China White; No. 2, China Yellow; No. 3, Konakry; No. 4, Kutny and No. 5, Mozambique.

These were sown in separate plots under ordinary field conditions and without any special treatment of soil or cultivation. The seeds were sown on July 20th broadcast at the rate of 1 lb. per acre over newly ploughed land and hoed in.

Results.

Variety.	Growing Period.	Average Height of Plants. Feet.	Colour of Seed.	Yield per Acre.
No. 1	92 days	1	White	470 lbs.
,, 2	92 ,,	1	Yellow	406 ,,
,, 3	140 ,,	3 to 4	White	423 ,,
,, 4	107 ,,	3	Black	151 ,,
,, 5	140 ,,	6	White	464 ,,

Comparative Yields.

For comparison the following yields are quoted :—

New Guinea	270 to 486 lbs. per acre.
India	350 ,, 450 lbs. ,, ,,
Assam	283 ,, — lbs. ,, ,,

The yields obtained on this occasion were therefore satisfactory particularly in the case of varieties Nos. 1 and 2.

The black seeded variety " Kutny " is said to produce an oil of superior quality which is used as a salad oil, the inferior oil being used in the manufacture of soap and as an adulterant for other oils.

Quality of the Oil.

Samples of the varieties grown at this Station were examined with the following results :—

Variety.	Moisture.	Oil.* Per cent.	Acid Value.	Saponification.
No. 1	8·09	53·69	0·54	186·60
No. 2	8·12	52·00	4·26	195·40
No. 3	4·66	50·03	1·33	188·10
No. 4	2·99	49·20	4·08	187·57
No. 5	2·91	52·11	1·54	193·80

* Calculated on the moisture – free seed.

Oil content.—A yield of 50 per cent. is considered normal; the above yields were therefore satisfactory although 49·20 is rather low.

Saponification Value.—186·6 is normal, but anything below this figure would be considered poor; 195·5 is, however, an excellent value.

The seed in these trials after ordinary threshing contained 11·7 per cent. of sticks and sand. Owing to the smallness of the seed, the sand was hardly noticeable. Cargoes reaching Europe frequently contain 3 to 5 per cent. of sand which can be eliminated by the use of suitable sieves. Adulteration of this crop would require very careful watching under Gambia conditions.

The market price of sesameseed fluctuates from about £11 to £24 per ton much the same as groundnuts. Chinese sesameseed was selling at £24 5s. per ton at the time of writing.

The cultivation of sesameseed is not recommended to replace groundnut cultivation as its monetary value per acre is much less owing to its lower yield, but there is no reason why well drained black soils which are unsuited for groundnut cultivation should not be profitably worked with this crop.

Groundnut Trials.

(Submitted by Mr. J. Pirie, Agricultural Superintendent.)

Manurial Experiments.

Owing to the writer's absence on leave these experiments, together with the Varietal Experiments, were conducted by the Director during the initial stage.

The manures were again applied immediately before sowing, the groundnut grass produced by the previous year's crop being left on the ground.

By eliminating permanent paths between the plots it was possible to cultivate by Fordson Tractor and two-furrow plough, instead of by manual plough.

There was a general falling off in the yield :—

Total yield, 1925	666 bushels	27	lbs.
Total yield, 1926	211 bushels	20	lbs.
A reduction of	455 bushels	7	lbs.

This can be traced to three main causes.

Rainfall.

This, although sufficient for the season, was very unevenly distributed, the plants stopped growing on three separate occasions owing to drought. During the writer's absence in the Protectorate, the nuts from the various plots, after being weighed for yield, were unfortunately mixed. It is therefore impossible to give the dried weights per bushel, but the results of the Varietal Experiments show a marked decrease in weight, and we may therefore assume that the Manurial Experiments would show a corresponding drop. During these periods of drought immature nuts ripened which, when harvested, produced a normal shell containing kernels only half the normal size, the result being a great reduction in the weight per bushel.

Disease.

All plants infected with Rosette disease were pulled up and destroyed, the infected plants varying from five to seventy-five per cent. There is evidence that Rosette disease develops and spreads more rapidly during dry periods, this theory is strengthened by the evidence of the past season. Even if the dry spells did not encourage infection the fact that the plants were frequently "below par" would make them more susceptible.

Soil Sickness and Absence of Humus.

These experiments tend to show that in dealing with a soil such as we have in the Gambia, artificial fertilizers alone will maintain fertility for a limited period only. At this interesting stage of the experiments it is

impossible to determine whether it is lack of humus, or groundnut soil sickness, that is the limiting factor. The native farmer has by generations of experience arrived at a system of fallowing the land by the simple method of letting it go back to bush for a number of years. There can be no doubt he has been compelled to adopt this system from sheer necessity as no native clears bush from choice.

It would appear therefore that soil sickness has more effect on the yield than the lack of humus. On the other hand the Gambian soil is so sandy and open that the absence of humus during comparatively long periods of drought must have a considerable effect on the plant's vigour. A uniform dressing of humus in the form of decayed grass has now been applied to each of the manurial plots in order to obtain some definite information on this very interesting and important matter.

It would appear from these experiments that the groundnut plant's susceptibility to Rosette disease is not affected to any great extent, if at all, by the application of either nitrogenous or phosphatic fertilizers. As this variation in yield is mainly due to the revages of this disease it would therefore be useless, even harmful, to postulate any theories as to which would be the best fertilizer or combination of fertilizers to use.

Results of Manurial Experiments, 1926.

Plot.	Manure.	Growth of Vine.	Period of Growth.	Degree of Infection. *Cercospora personata.*	Percentage of Infection with Rosette.	Yield per Acre in Dried Nuts.	
			Days.			Lbs.	Bushels.
1	Bone Meal	110	100	1%	5%	528	18·24
2	Basic Slag, Nitrate of Soda	100	103	1%	6%	656	23·12
3	Nitrate of Soda, Basic Slag, Sulphate of Potash	150	110	1%	5%	1,060	37·24
4	Basic Slag, Sulphate of Potash	120	109	1%	20%	476	17
5	Lime, 1924	90	99	1%	75%	356	12·20
6	Nitrate of Soda, Sulphate of Potash	125	113	1%	60%	232	8·8
7	Dried Blood	150	113	1%	40%	672	24
8	Superphosphate	90	97	2%	30%	736	26·8
9	Basic Slag	90	101	2%	25%	536	19·4
10	Control.—No Manure ...	100	102	1%	20%	676	24·4

Varietal Trials.

Nine one-acre plots, on the same site as in 1925, were set aside for these trials. Cultivation was by Fordson Tractor and two-furrow plough.

Various manures had been applied before planting 1925 (see table), but no further manures have been applied.

The seed was again carefully selected, forty pounds to the acre being used.

Comparison of Varieties.

Basse.—This variety continues to give a good yield and is fairly resistant to both Rosette Disease and Leaf Spot (*Cercospora personata*).

Philippine White.—Although disappointing in yield this season, this variety has been so prolific in previous years and shows such a marked degree of resistance to both Rosette Disease and Leaf Spot that we consider it one of our best.

The erratic rainfall of the past season probably had more effect on it than on some of the other varieties. As indicated by the weight per bushel, there was a greater percentage of empty shells than in the case of any other variety under review.

Philippine Pink.—Given exhaustive trials over three seasons, this variety has on each occasion been a failure, it is far too susceptible to disease for Gambian conditions.

This was the only variety grown on the Government Seed Farms in the Protectorate to be at all seriously infected with Leaf Spot.

Zaria.—This variety compares very favourably with the Gambian variety. Although not weighing so much per bushel it gave a higher yield per acre, and whilst it may not be so much better as to ever supersede the variety at present grown in the Gambia, it may be said to be equally suitable.

Senegal.—This variety has again been a comparative failure, it has proved more susceptible to both Rosette Disease and Leaf Spot than the Gambian groundnuts. As will be seen by the table the yield was the second lowest.

Mauritius.—After two season's trial this variety appears, like the Philippine Pink, to be unsuited to Gambian conditions.

The plants were relatively healthy and vigorous but the yield was very poor.

Summary.

The yields were in every case less than those of previous years. Undoubtedly the chief factor was the uneven distribution of rain, on four separate occasions, owing to drought, the plants stopped growing. The erratic rainfall is also reflected in the light weight per bushel due to premature ripening, also the variation in the size of the nuts. In addition, all plants showing signs of Rosette Disease were removed from the plots before ripening and destroyed.

As in the case of the manurial experiments, but less marked, the soil showed signs of groundnut sickness.

To remedy this the manurial plots are to receive a uniform application of organic matter in the form of decayed grass prepared by treating with "Adco." A system of crop rotation will be followed in connection with the Varietal plots.

VARIETAL AND MANURIAL RESULTS.

Plot.	Variety.	Manure.	Period of growth. Days.	Degree of infection with *Cercospora Personata*.	Percentage of infection with Rosette.	Yield per Acre in Lbs.	Dried Nuts. Bushels.	Weight per cwt. bushel. Dried Nuts. Lbs.
1	Basse ...	Castor meal, 4 cwt. Bone meal, 4 cwt.	91	Slight	3%	1,405	50·5	21
2	Philippine White.	Rape meal, 4 cwt. Bone meal, 4 cwt.	93	Nil	Less than 1%	994	35·12	16¾
3	Philippine Pink No. 1.	Bone meal, 4 cwt. Dried blood, 4 cwt.	83	Heavy	50%	736	26·8	19½
4	Zaria No. 1 ...	Bone meal, 4 cwt. Nitrate of Soda, 86 lbs.	86	Slight	Less than 1%	1,194	42·18	21½
5	Senegal ...	Bone meal, 4 cwt. Sulphate of Ammonia, 56 lbs.	105	Medium	50%	572	20·12	23½
6	Gambia No. 1	Bone meal, 4 cwt. Nitrate of Soda, 56 lbs.	109	Medium	10%	1,107	39·15	24¾
7	Zaria No. 2 ...	Bone meal, 4 cwt.	84	Slight	3%	490	17·14	21¾
8	Philippine Pink No. 2.	Bone meal, 4 cwt.	80	Heavy	50%	834	29·22	19½
9	Mauritius ...	No Manure ...	107	Slight	3%	673	24·1	22¾

IMPERIAL INSTITUTE OF THE UNITED KINGDOM, THE COLONIES AND INDIA.

REPORT ON GROUNDNUTS FROM THE GAMBIA.

The eight samples of groundnuts which are the subject of this report were received for examination at the Imperial Institute on the 16th February, 1927, from the Director of Agriculture in the Gambia, and are referred to in his letter No. Ag.B.24/1927, dated 8th January, 1927.

It was requested that the samples should be examined in continuation of the previous investigations.

DESCRIPTION.

The samples, which were all in good clean condition, are described below :—

Sample.	Weight.	Nuts.	Kernels.
	lbs.		
No. 1 Philippine White ...	3	¾ to 1½ in. in length (mostly 1 to 1½ in.) and ½ in. in diameter.	Small to large; plump. Skin cream-coloured. Average weight, 0·43 gram.
No. 2 Mauritius... ...	2¼	¾ to 1½ in. in length (mostly 1 to 1¼ in.) and ½ in. in diameter.	Small to medium; fairly plump on the whole. Skin pinkish-brown to pink. Average weight 0·38 gram.
No. 3 Gambia	3¾	¾ to 1½ in. in length (mostly 1 in.) and ½ in. in diameter.	Small to medium; plump Skin light brown to pink. Average weight, 0·38 gram.
No. 4 Senegal	2	¾ to 1 in. in length (mostly ⅞ to 1 in.) and ⅜ to ½ in. in diameter.	Small; fairly plump on the whole. Skin pinkish-brown. Average weight, 0·31 gram.

Sample.	Weight.	Nuts.	Kernels.
	lbs.		
No. 5 Zaria	2	1 to 1½ in. in length (mostly 1 to 1¼ in.) and ½ in. in diameter.	Medium to large ; fairly plump. Skin pinkish-brown to pink. Average weight 0·40 gram. About 20 per cent. undeveloped.
No. 6 Philippine Pink ...	2¼	1 to 1½ in. in length (mostly 1 to 1¼ in.) and ½ in. in diameter.	Medium to large ; plump. Skin pale pink. Average weight, 0·44 gram.
No. 7. Basse	2¾	¾ to 1¼ in. in length (mostly about 1 in.) and ½ in. in diameter.	Medium to large ; plump. Skin pinkish-brown to pink, mostly pinkish-brown. Average weight, 0·39 gram.
No. 8. Mixed varieties (White, pink, Mauritius, Zaria).	2½	¾ to 1½ in. in length (mostly 1 to 1½ in.) and ½ in. in diameter.	Medium to large ; varying in plumpness. Skin cream, light brown and pinkish brown. Average weight, 0·40 gram. About 12 per cent. undeveloped.

The nuts of No. 1 (Philippine White) contained mostly two or three kernels, whilst those of the remaining samples contained mostly two kernels; in the case of No. 8 (mixed varieties) about 10 per cent. of the nuts contained three kernels.

Results of Examination.

The nuts were examined with the following results :—

	No. 1. Per cent.	No. 2. Per cent.	No. 3. Per cent.	No. 4. Per cent.	No. 5. Per cent.	No. 6. Per cent.	No. 7. Per cent.	No. 8. Per cent.
Husks in nuts	31	30	29	26	35	31	30	33
Kernels in nuts	69	70	71	74	65	69	70	67
Moisture in kernels	5·0	5·0	5·0	4·8	5·2	5·3	5·2	5·2
Oil in kernels, expressed on :—								
Entire nuts	32·6	34·6	35·1	35·7	29·6	31·1	33·7	31·0
Kernels, as extracted from the nuts.	47·3	49·4	49·5	48·2	45·6	45·1	48·1	46·3
Moisture-free kernels	49·8	52·0	52·1	50·6	48·1	47·6	50·7	48·8
Acid value of oil:	2·3	1·4	0·7	1·0	0·8	0·7	0·3	0·9
Corresponding to :— Free fatty acids (expressed as oleic acid) per cent. ...	1·16	0·70	0·35	0·50	0·40	0·35	0·15	0·45

Remarks.

It will be observed that in none of the samples does the percentage of oil (calculated on the unshelled nuts) reach the commercial standard of 37 per cent. for undecorticated groundnuts of good quality. This is largely due to the fact that the nuts have a rather larger proportion of husk than usual.*

* Note by Director of Agriculture :—

This larger proportion of husk, or "excess shell" as it is termed in the trade, is due to adverse weather conditions recorded and commented upon in this report. On several occasions during the normal growing period growth stopped owing to lack of rain and the nuts ripened before they were fully developed. See also Appendix VIII.

When the amount of oil present is expressed on the kernels, it is seen that No. 2 (Mauritius), No. 3 (Gambia), No. 4 (Senegal), and No. 7 (Basse) contain a normal percentage of oil (48 per cent.) for decorticated groundnuts of good quality. In the case of the other four samples the amounts of oil vary from 45·1 per cent. in the kernels of No. 6 (Philippine Pink) to 47·3 per cent. in those of No. 1 (Philippine White).

The oils extracted from the kernels by light petroleum were in every case of normal appearance. The percentage of free fatty acids was satisfactorily low in all cases, only one of the samples (No. 1, Philippine White) containing more than 1 per cent.

It is of interest to note, on comparing these samples with those of the corresponding varieties dealt with in Imperial Institute report of the 27th April, 1926, that in every case the percentage of husk is higher and the average weight of a kernel lower than in the earlier samples. The percentage of oil in the kernels is also lower than in the previous samples, and especially in the case of No. 5 (Zaria) and No. 6 (Philippine Pink), where the difference exceeds 3 per cent.

PROPOSED GOVERNMENT FRUIT FARM AT ABUKO.

Proposals were made and arrangements completed in May, 1926, for this Department to take over the Government land at Abuko, comprising some 200 acres, for the development of a Government fruit farm.

This land is eminently suited for such a purpose, and in a Colony where fruit is so scarce, should, in time, prove of great economic importance.

It was intended that special areas should be devoted to the cultivation of limes—with a view to demonstrating the possibilities of this crop in the Gambia—budded oranges and grape fruit, grafted mangoes, dwarf coconuts, bananas, avocado pears and similar permanent crops.

Although every effort was made during the short rainy season to commence this work, and labourers had been actually engaged for the purpose, it was found impossible to undertake the necessary European supervision, owing to illness of the two available Superintendents at the same period. It is with much regret that I have to record the postponement of this work.

WORK CONNECTED WITH INSECT AND FUNGUS PESTS AND THEIR CONTROL.

Fumigatorium.

The usual restrictions for the prevention of the introduction of foreign pests and diseases were enforced during the period under review. Fifty-three consignments of seeds and plants were imported into the Colony, but in no instance was fumigation or disinfection necessary.

Ants.

Ants have proved particularly destructive both in nursery stock and field plots. Sugar-cane plots suffered seriously in this respect and mature casuarina and rose trees were completely eaten off at soil level. Groundnut cultivation also suffered from the ravages of ants. Native farmers have a practice of pushing a piece of dead wood into the soil where ants are observed at work. This appears to keep the ants busy until the groundnuts are lifted. It is proposed to conduct experimental trials with cyanogas calcium cyanide in the near future.

Rosette Disease.

Special attention was again paid to this disease with a view to gathering as much information as possible as to its field characters. Outbreaks of this disease were much more common on groundnut cultivation within three miles of the sea than on the farms up river. From experiments conducted by this Department, it was found that the degree of infection is much greater in self-sown nuts—nuts left in the ground from the previous season—than in the case of shelled nuts sown with the rains.

Instances have frequently occurred where the two kernels contained in the same shell have germinated and developed together. One has been heavily infected with rosette disease and failed to produce seed, while the other has shown no effects of the disease and borne the normal crop. It was hoped that seed obtained from the unaffected plant would have shown some immunity to this disease, but the hoped for results were not realised. In South Africa, where a competent scientific staff is investigating this disease, *Aphis leguminosæ* is said to be responsible for spreading this disease, but up to the present this green fly has not been collected in the Gambia. Among a few insects collected from groundnut cultivation in this Colony and submitted to the Imperial Bureau of Entomology were found a Capsid and a Jassid, and Dr. Guy Marshall is of the opinion that the Jassid is probably responsible for the spread of this disease in the Gambia.

During the coming season a collection of all insects visiting groundnut cultivation will be made as far as possible.

Rotation of crops is the usual method employed in controlling such diseases, but under our local conditions, where the whole Colony is dependent upon the one crop, a rotation of a sufficiently long period is not easy to devise or to establish.

OBSERVATIONS ON GROUNDNUTS.

(Conducted by Mr. T. R. Hayes, M.Sc., Agricultural Superintendent.)

Effect of Rosette Disease and Ant Attack on "Excess Shell."

In view of the great importance attached to "excess shell," as shown in groundnut account sales, the following investigations were undertaken to determine to what extent rosette disease and ant attack were responsible for this unsatisfactory feature of some of the groundnut cargoes and to ascertain the average number of nuts on a plant under varying conditions. In all, a thousand groundnut plants were examined, and the figures analysed and compared.

Below are given extracts from the original tables, and some of the conclusions they indicate.

The groundnut is anything but regular in habit; for instance, in one series of 100 plants (all apparently healthy before lifting), the number of good nuts per plant varied from nil in one case to 104 at the other extreme. The more variable a plant is, the more experiments must be performed to establish a rule. It is therefore proposed to continue these interesting, but by no means conclusive, experiments, next season.

Experiment I.

Variety.—Gambia.

Plot examined.—Number 3 plot, Manurial Section.

This receives every year a complete manurial dressing (inorganic). The plot was visibly infected by Rosette disease to the extent of 2 per cent. Nuts examined as soon as lifted on 26th October.

Three series of plants were examined :—

(*a*) Plants apparently *free from Rosette.*

(*b*) *Slightly affected Plants.*—These showed distinct signs of Rosette, but had made good growth, and were apparently little the worse.

(*c*) *Badly infected Plants.*—In these, amount of vine was limited, and practically the whole vine was deficient in colour.

Table A shows the average for 100 plants taken from Class A. The averages are classified according to the number of good nuts on each plant. In column 2 is shown the number of plants out of the total 100 bearing the respective numbers of good nuts. The figures in columns 6 and 7 are calculated on the average total number of nuts per plant, and included in the good nuts are those attacked by ants, as the exclusion of the latter would hinder our consideration of other factors.

Similarly, table B gives the figures for Class B, the "slightly infected plants."

Table A.—Non-Infected Plants.

1	2	3	4	5		
Number of good nuts per plant.	Number of plants.	Average numbers of nuts per plant.			Percentage on Total.	
		Good.	Empty Shells.*	Total.	Good.	Empty Shells.
0—10	7	8·9	8·3	17·2	52	48
11—20	21	18·3	11·9	30·2	60	40
21—30	15	29·8	10·4	40·2	74	26
31—40	22	39·0	11·9	50·9	77	23
41—50	17	50·9	13·1	64·0	80	20
51—60	7	61·4	19·1	80·5	77	23
61—70**	4	70·2	21·0	91·2	77	23
over 70	7	88·7	17·1	105·9	84	16
Total ...	100					

Table B.—Partially Affected Plants.

1	2	3	4	5		
Number of good nuts per plant.	Number of plants.	Average number of nuts per plant.			Percentage on Total.	
		Good.	Empty Shells*	Total.	Good.	Empty Shells.
0—10	28	8·4	20·3	28·7	29	71
11—20	37	19·7	22·6	42·3	47	53
21—30	15	28·5	19·1	47·6	60	40
31—40	13	39·2	25·1	64·3	61	39
41—50**	4	55·1	26·5	81·6	67	33
51—60**	2	57·5	23·5	81·0	71	29
61—70**	1	76·0	30·0	106·0	72	28
over 70	—	—	—	—	—	—
Total ...	100					

* Empty shells include shrivelled nuts due to drought and disease.

** No importance can be attached to these figures as they represent the average of only a few plants.

(1) In both Tables A and B the percentage of good nuts increases with the total number of nuts on the plant; the percentage of empty shells correspondingly decreases.

In practice some of the empty shells are eliminated in threshing, and some are crushed in transit and rejected by the screens, but many of these nuts reach the trader, and bear a significant relationship to the " lightness " or otherwise of the crop.

Therefore, an abundant cropping plant, having a lower proportion of empty shells, etc., yields a heavy aggregate of nuts, *i.e.*, the weight of a bushel of such nuts is greater.

(2) The average number of empty shells, etc., does not vary a great deal; from 8 to 17 in Table A and from 20 to 30 in Table B.

TABLE C.—BADLY INFECTED PLANTS.

Number of good nuts per plant.	Number of plants Examined.	Average number of Nuts per plant.			Percentage on Total.	
		Good.	Empty Shells.	Total.	Good.	Empty Shells.
0—10	84	4·0	8·1	12·1	33	67
11—20	14	17·0	8·9	25·9	65	35
21—30	2	30·0	16·0	46·0	63	37
Total ...	100					

TABLE D.—SUMMARY OF COUNTS.

Series.	Average number of nuts per plant.			Percentage of each kind.	
	Good.	Empty shells.	Total.	Good.	Empty Shells
A.—No Rosette	39·7	12·9	52·6	76	24
B.—Slight Rosette ...	21·8	18·0	39·8	55	45
C.—Bad Rosette	6·2	8·4	14·6	43	57

With the slightly affected nuts, the average of good nuts drops heavily to 21·8, while the empty shells, etc., increase from 12·9 to 18·0. These relations are more clearly seen in the percentage columns.

Thus we see that these plants have suffered severely, although they only appeared to be slightly affected by Rosette. It is therefore reasonable to suppose that the plant suffers deterioration before the first sign of disease appear. As these plants had practically a normal growth of vine, it appears that the disease does not lower the yield primarily by limiting respiration, but in some other way.

In addition to the lower averages of the total number of nuts per plant in B and C, the percentage of empty shells is increased and the percentage of good nuts correspondingly lowered.

This shows that Rosette works :—

(*a*) By reducing the total number of nuts on the plant.

(*b*) By increasing the number of empty shells, etc., among those nuts which are formed.

Experiment II.

It was indicated in the previous experiment that the groundnut plant suffered deterioration from Rosette, before the familiar symptoms of the disease appeared.

An experiment was therefore carried out to test this hypothesis.

Variety.—Gambia.

Plot.—Lower Wireless Field.

This plot had three isolated patches of Rosette infection in one corner, and the rest of the plot appeared quite healthy.

Two series of plants were examined:—E, 100 well-grown plants, apparently free from disease, were taken from positions adjacent to badly diseased plants; F, 100 plants from a section of the same plot, as distant as possible to the diseased part, and to the windward side.

By comparing these two series, it would be seen if the first one, which was more likely to be diseased, differed from the second series.

Considerations of space prevent the inclusion of details similar to those in Tables A and B, but the results confirmed the inferences already drawn in Experiment I.

Below are given the summaries of the counts:—

Series.	Average number of nuts per plant.			Percentage on total number of nuts.	
	Good.	Empty Shells.	Total.	Good.	Empty Shell.
				Per cent.	Per cent.
E.	16·8	8·6	25·4	66	34
F.	23·4	6·4	29·8	78	22

The striking difference between the two kinds of nuts is too great to be attributed to chance, or to different soil conditions in the same plot. The good nuts are reduced from 23·4 to 16·8 and the empty shells, etc., increased.

These reductions and increases may be stated quantitatively as percentages.

The percentage reductions or increase due to Rosette are shown below. The parallel figures for "No Rosette" and "Slight Rosette" in Experiment I. are included for comparison.

Presence of Rosette reduces:—

	Exp. II.	Exp. I.
Total number of nuts by	18%	24%
Number of good nuts by	43%	64%
And increases number of empty shells by	34%	55%

It is interesting to note that, although the figures are of the same order in each case, in Experiment I, where the Rosette has already showed itself, the deterioration is greater than in Experiment II, where it is still (we presume) working unseen.

Colour of Groundnuts.

In Experiment II, the nuts were divided into two sections, light coloured and dark coloured. As there was a gradual change in colour from light to dark, this was necessarily an arbitrary selection, which would vary with different observers.

The percentage of discoloured nuts in the series E (free from Rosette) and F (adjacent to Rosette) are as follows :—

Series.	Percentage of dark nuts in Total good nuts.	Percentage of dark nuts in Total empty shells.
	Per cent.	Per cent,
E.	33	52
F.	38	59

The number of dark nuts does not decrease with freedom from Rosette, but, on the contrary, increases. Thus the dark colour is not due to Rosette disease, but to one (or more) Fungi which tend to avoid plants already attacked by Rosette.

The high percentage of dark nuts in the empty nuts indicates that a number of the latter are due to Fungus disease. As this increase is about the same for both E and F, it does not discount our previous remarks on Rosette.

The percentage of dark coloured nuts decrease both in the good and empty nuts, as the number of nuts on the plant increases, as is shown in the following details of series F.

Number of Good Nuts per plant.	Total number of nuts per plant.	Number of plants examined.	Percentage of dark nuts in total good nuts.	Percentage of dark nuts in total empty shells.
			Per cent.	Per cent.
0—10	12	7	54	88
11—20	22	39	41	60
21—30	37	32	37	59
31—40	41	16	36	50
over 40	62	6	40	61

Thus it is again apparent that the plant bearing a high number of nuts is better able to resist disease, if we ignore the unexpected rise in the " over 40 " column.

Damage by White Ants.

In all counts, the number of nuts attacked by ants was noted. The first four varieties in the table were grown on the highest part of the Station, on light sandy soil. The average of these four, taken from a typical groundnut

soil, is as high as 10 per cent., which indicates a loss of at least 6,000 tons of groundnuts to the Gambia in a season.

Kind of Land.	Variety.	Percentage eaten by Ants.
		Per cent.
High position and light, sandy soil.	Philippine White.	11
	Zaria.	11
	Gambia. (See Exp. I.)	8
	Basse.	10
Low land.	Mauritius.	4
	Gambia. (See Exp. II.)	2

In the last two varieties, ant attack was considerably less. The low land was much darker, and finer in texture than the higher land. It is the type of land usually reserved for cereals. Analysis of this soil showed that the amount of organic matter was 1·15 per cent., while that in the higher ground (Gambia) was only 0·77 per cent.

The following are the details of ant attack observed in Experiment I :—

Series.	Percentage of plants visited by ants.	Average number of ant-eaten nuts per plant.	Percentage of ant-eaten nuts.
	Per cent.		Per cent.
(A) No Rosette ...	82	4·2	8
(B) Slight Rosette ...	78	3·7	9½
(C) Bad Rosette ...	51	1·1	8

From these figures it appears that ants prefer healthy plants to those infected with Rosette disease, but when they do visit a plant they do the same amount of damage (about 9 per cent. of the nuts on the plant being eaten), whether the plant is diseased or healthy.

It was found that they attack large and small plants indiscriminately. Of the total number of nuts attacked, 91 per cent. were completely destroyed, the remaining 9 per cent. being only partially eaten.

AGRICULTURAL EDUCATION AND TRAINING.

Agricultural Instruction.

Arrangements are being made by this Department to give the boarders of the Armitage School, Georgetown, a training in elementary agriculture. The Government Seed Farm at Lamin Koto being within easy reach of this school offers splendid facilities for this purpose. The instruction will be as practical as possible and a certain area of land will be set aside for the sole use of these pupils. Each boy will be allotted a special section in which he will be taught to grow vegetables, flowers and fruits, from the sale of which he will be able to make a certain amount of pocket money, which will tend to develop his interest in the commercial aspect of agriculture. They will be kept in close touch with the more important work of the farm and in time will take part in that work.

CORRESPONDENCE AND DISTRIBUTION OF INFORMATION ON AGRICULTURAL MATTERS.

Registered communications numbering 1,052 were dealt with at the Director's office during the year, including reports on various subjects, and 180 minute papers.

Expenditure, 1926.

The votes of the Department of Agriculture for the year under review were as follows :—

	£
Personal Emoluments	4,024
Sea Passages	214
Transport	500
Miscellaneous Requisites	150
Scientific Apparatus	150
Plants, Seeds, Fertilizers, Chemicals for Plant Disinfection	400
Labour	1,520
Technical Library	25
Tools, Implements and Machinery...	680
Uniforms	85
Outfit Allowances	90

The actual expenditure for the year was £6,880. 4s. 8d., being £957. 15s. 4d. below the approved estimate. This reduction was largely due to our inability to proceed with the establishment of a fruit farm at Abuko.

Plant and Seed Exchange, Foreign and Local.

The thanks of this Department are due to the following for contributions of plants and seeds :—His Excellency Captain Sir Cecil Armitage; The Royal Botanic Gardens, Kew; The Gardens La Mortola, Italy; The Bureau of Plant Industry, U.S.A.; Dr. David Fairchild; The Argotti Botanic Gardens, Malta; The Egyptian Ministry of Agriculture; The Department of Agriculture, Rhodesia; The Agricultural-Horticultural Society, India; The Department of Agriculture, Trinidad; The Department of Agriculture, Ceylon; Monsieur F. Orcel; and the Rev. Father Meehan.

Herbarium.

During his tour in the Protectorate between May and September, Mr. Hayes devoted some attention to collecting and preparing indigenous plant specimens for determination. A large collection was got together and prepared in readiness for despatching to Kew upon his return to headquarters, but owing to difficulties of transport coupled with unfavourable weather conditions the bulk of the collection had to be discarded. The following

specimens were, however, preserved, and we are indebted to Kew for the following determinations :—

Crotalaria retusa L.
Clerodendron capitatum Schum.
Dialium guineense Willd.
Telanthera maritima Moq.
Physalis minima L.
Guiera senegalensis Lam.
Passiflora foetida L.
Pterocarpus erinaceus Poir.
Holarrhena ovata A.DC.
Strophanthus latisepalus Stapf.—only 1 specimen previously at Kew.
Securidaca longipedunculata Fres.
Detarium senegalense Gmel.
Millettia sp. ?
Hyparrhenia Ruprechtii Fourn.
Gymnosporia senegalensis Loes.
Cola cordifolia R.Br.
Combretum mucronatum Sch. & Thonn.
Xanthoxylum senegalense DC.
Nelsonia campestris R.Br.
Ipomoea sp.
Ipomoea digitata L.
Combretum Lecardii Engl. & Diels.—a rare species.
Cassia Sieberiana DC.

A few specimens, including three orchids new to our collection, were collected by the writer and determined at Kew as follows :—Lissochilus nr. L. Millsonii Rolfe. Eulophia guineensis Lindl. Lissochilus arenarius Lindl. Drimiopsis sp. Nymphaea Lotus L. Kaempferia aethiopica Benth. Curculigo gallabatensis Schweinf.

Distinguished Visitors.

In January a party of distinguished scientists visited the Colony in connection with botanical and agricultural research. The main object being the introduction of new plants into the U.S.A. and the study of tropical plant diseases. The party included Dr. David Fairchild, Dr. H. McKinney, Dr. F. Schultz, all of the Bureau of Plant Industry, Washington, and Dr. J. M. Dalziel, of Kew. During their eight days' tour of the Colony and Protectorate, during which period many plants were collected, they were accompanied by officers of this Department.

The following were among the distinguished visitors who paid a special visit to the Gardens at Cape St. Mary during the period under review :—

Their Graces the Duke and Duchess of Sutherland; Count and Countess Raben-Lewetzau; the Honourable W. G. A. Ormsby-Gore and party; His Excellency the Governor-General of French West Africa.

METEOROLOGY.

The following are summaries of the observations recorded at the Agricultural Station, Cape St. Mary, for the period commencing January 1st and ending December 31st, 1926.

Rainfall.—The rainfall for the year was 34·93 inches, being 18·63 inches less than that recorded in the previous year. The first light shower fell on June 4th and the last on October 8th. During this short rainy

season of eighteen weeks, rain fell on 62 days, this being 13 days less than during the previous year. The maximum precipitation in one day being 3·06 inches on August 29th.

Wind.—From January to May the wind blows from N.E. and N.W. During the months of June to October the wind blows from S.W. or W. and from N.E. during November and December. The mean daily velocity of the wind passing over the station was 1·49 miles per hour, the mean maximum being 9·70 miles per hour on August 5th. The anemometer has now been moved to an exposure which will register the actual wind blowing from the sea.

Temperature.—The mean maximum temperature for the year was 88·8° and the mean minimum 70·6°. The hottest month of the year was October when the mean maximum temperature was 93° and the mean minimum 75°. The extreme maximum temperature was 105°, recorded on March 9th, and the extreme minimum 61° was recorded on December 30th. The mean range of temperature for the year was 18·2°.

Humidity.—The mean relative humidity for the year was 65 per cent. A very considerable range of humidity was, however, recorded, the highest monthly mean being 85 per cent., recorded for August, and the lowest, 47 per cent., for March. The mean elastic force of vapour was 0·685, the mean dew point 66·8°.

General Rainfall over the Whole Protectorate.

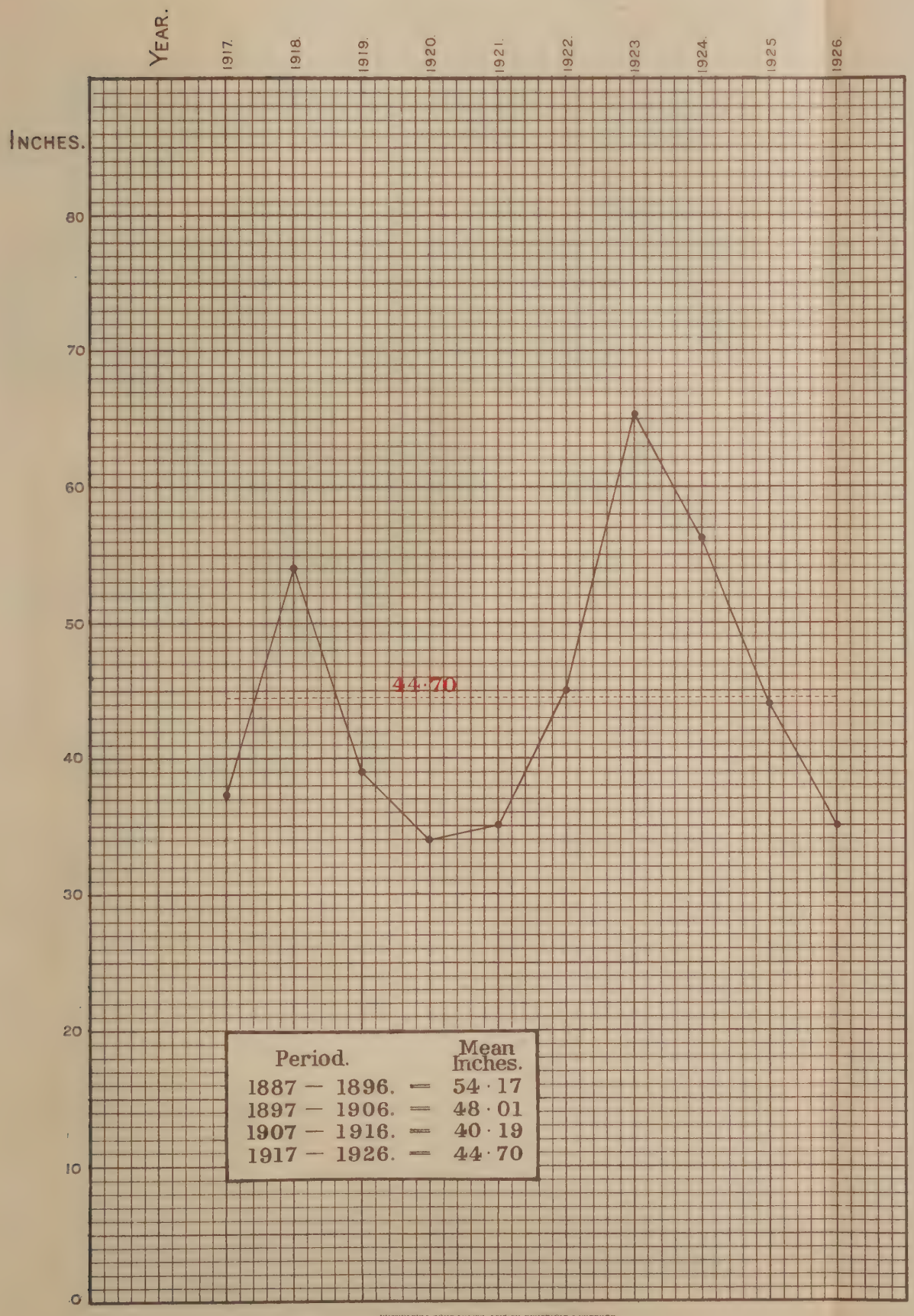
During the year under review twelve new rain recording stations were established at our own seed farms in the Protectorate to enable reliable information to be obtained as to the distribution of the rains with a view to determining its influence on the groundnut crop.

The rain recorded stations now established are as follows :—

Name.	Miles from Bathurst.	Total Rainfall for 1926.
Bathurst	0	35·05
Cape St. Mary	8	34·93
Sukuta	10	32·19
Kansala	40	Not complete
Kerewan	40	28·51
Kudang	136	32·17
Soma	114	29·88
Bansang	186	35·55
Kau-ur	118	29·29
Kuntaur	150	34·04
Georgetown	176	31·47
Lamin Koto...	176	31·26
Mansajang	242	42·22
Wuli	243	42·12
Fattoto	288	43·65

The monthly rainfall for each of these stations is given in Appendix II.

CHART II. — ANNUAL RAINFALL, BATHURST, THE GAMBIA. 1917 - 1926.



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CONCLUSION.

The thanks of this Department are due to Dr. A. W. Hill, C.M.G., F.R.S., Director Royal Botanic Gardens, Kew; Dr. A. K. Marshall, C.M.G., F.R.S., Director Imperial Bureau of Entomology; Dr. E. J. Butler, C.I.E., Director Imperial Bureau of Mycology; and to Lt.-Gen. Sir William Furse, Director Imperial Institute, for valuable assistance rendered during the year.

In closing this, the third annual report of the agricultural department, I desire to briefly record the sincere thanks due to His Excellency Capt. Sir Cecil Armitage, K.B.E., C.M.G., D.S.O., late Governor, for his whole-hearted support and personal interest in agriculture which he maintained throughout his term of office and which earned for him the title of "The Father of Agriculture in the Gambia." Sir Cecil's retirement in January last was a distinct loss to the agricultural community, and to his efforts much of the present agricultural prosperity of the Gambia is due.

ARCHIBALD J. BROOKS,

Director.

May 27th, 1927.

APPENDIX I.

Meteorological Report for 1926.

DEPARTMENT OF AGRICULTURE, THE GAMBIA.

Latitude 13° 29′ 04″ N.
Longitude 16° 40′ 24″ W.

Hours of observation, 9.0 a.m.

Months.	Air Temperature.							Dew Point.	Elastic force of vapour.	Relative Humidity. (Satn. 100).	Wind velocity. Miles per hour.	Rain-fall.	Number of days on which rain fell.
	Means.		Range.	Absolute Maximum and Minimum.									
	Maximum.	Minimum.		Max.	Date.	Min.	Date.						
	°	°	°	°		°		°	Ins. of Mercury.	Per cent.		Ins.	
January	86	67	19	94	31st	62	23rd	55·0	·435	52	1·69	—	—
February	87	66	21	99	16th 17th	63	23rd	56·1	·450	52	1·42	—	—
March	91	69	22	105	9th	65	15, 23, 29th	57·0	·466	47	2·18	—	—
April	85	68	17	94	18th 19th	64	1, 7, 13th	66·8	·658	71	2·76	—	—
May	85	69	16	92	21st	65	7th	65·5	·628	63	2 30	—	—
June	91	75	16	96	5, 6, 7, 11th	71	1st	75·7	·888	76	1·64	2·46	8
July	88	73	15	93	1st	69	2nd, 12th	78·0	·956	85	1·54	10·94	18
August	87	74	13	92	12, 16, 18th	70	On 7 days.	76·3	·905	80	1·15	14·00	18
September	90	73	17	95	20th	68	10th	76·3	·905	80	·96	6·59	14
October	93	75	18	97	24th	69	9th	76·1	·904	72	·67	·94	4
November	92	71	21	98	8th	66	28th	60·9	·534	50	·64	—	—
December	89	66	23	97	30th	61	11th	58·9	·497	55	·96	—	—
Totals	1,064	846	218	1,152	—	793	—	802·6	8·226	783	17·91	34·93	62
Means	88·8	70·6	18·2	96·0	—	66·1	—	66·8	0·685	65	1·49	—	—

Mean Sea Level determined from readings taken at the tide gauge, Bathurst, over period January 1st to December 31st, 1925.

APPENDIX II.

Monthly Summary of Meteorological Returns.

Bathurst.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Means
Highest	93	96	102	103	97	100	96	92	91	93	91	94	—
Lowest	63	58	60	60	62	66	68	68	68	70	62	60	—
Mean	74·5	75·3	76·2	76·7	76	81·1	81·5	79·8	79·1	81·1	78	76	—
Variation	31	34	37	33	34	27	25	21	21	19	21	33	28
Relative Humidity	58	58	47	62	52	68	73	64	75	74	63	59	62·9
Cape St. Mary.													
Highest	94	99	105	94	92	96	93	92	95	97	98	97	
Lowest	62	63	65	64	65	71	69	70	68	69	66	61	—
Mean	77·3	75·1	78·8	77	77·4	83	80·6	81·2	81·8	84·3	82	77	—
Variation	26	35	33	24	27	22	23	20	25	25	25	34	26·7
Relative Humidity	52	54	48	71	64	74	86	83	77	80	50	55	66·2
Georgetown.													
Highest	104	105	110	110	113	104	99	96	96	98	100	98	—
Lowest	57	56	65	65	72	72	73	70	70	70	64	58	—
Mean	80·3	80·5	88·2	89	91·8	88	85	83·3	83	84·4	82	78	—
Variation	44	40	41	40	37	22	23	23	26	24	31	40	32·7
Relative Humidity	36·5	40	34	37	42	78	76	82	76	79	57	41	56·5

APPENDIX III.

Rainfall Recorded at the Official Recording Stations throughout the Colony and Protectorate during the year 1926.

Province.	Jan. to May.	June.	July.	Aug.	Sept.	Oct.	Nov. to Dec.	Total.
Kombo and Fogni :—								
Bathurst ...	No Rain	2·15	10·46	12·11	8·13	2·20	No Rain	35·05
Cape St. Mary	,, ,,	2·46	10·94	14·0	6·59	·94	,, ,,	34·93
Sukuta ...	,, ,,	—	7·93	13·11	8·59	2·56	,, ,,	32·19
Kansala ...	,, ,,	—	12·27	8·85	7·28	—	,, ,,	—
Average for Province ...	No Rain	2·30	10·40	12·01	7·64	1·90	No Rain	34·5
North Bank :—								
Kerewan ...	No Rain	1·92	9·33	8·99	7·74	·53	No Rain	28·51
South Bank :—								
Kudang ...	No Rain	10·10	6·05	7·82	6·27	1·93	No Rain	32·17
Soma	,, ,,	3·04	10·58	9·22	5·91	1·13	,, ,,	29·88
Bansang ...	,, ,,	7·45	6·83	12·50	6·43	2·34	,, ,,	35·55
Average for Province ...	No Rain	6·86	7·82	9·84	6·20	1·80	,, ,,	32·53
MacCarthy Island :—								
Kau-ur ...	No Rain	3·95	6·34	9·75	7·48	1·77	No Rain	29·29
Kuntaur ...	,, ,,	5·83	7·77	9·70	8·90	1·84	,, ,,	34·04
Georgetown ...	,, ,,	5·09	6·35	8·71	8·83	2·49	,, ,,	31·47
Lamin Koto ...	,, ,,	5·23	5·69	8·94	8·28	3·12	,, ,,	31·26
Average for Province ...	No Rain	5·02	6·53	9·27	8·37	2·30	No Rain	31·51
Upper River :—								
Mansajang ...	No Rain	6·60	7·90	15·86	9·51	2·35	No Rain	42·22
Wuli	,, ,,	6·93	7·62	14·33	10·24	3·00	,, ,,	42·12
Fattoto ...	,, ,,	5·04	9·87	15·26	12·17	1·28	,, ,,	43·62
Average for Province ...	,, ,,	6·19	8·46	15·15	10·64	2·21	,, ,,	42·65

APPENDIX IV.

Annual Rainfall, Bathurst, for the years 1887-1926, showing averages for the last Four Decades.

		Inches.			Inches.
1887	...	53·96	1907	...	34·00
1888	...	39·09	1908	...	43·54
1889	...	32·06	1909	...	56·59
1890	...	60·31	1910	...	44·00
1891	...	53·41	1911	...	28·14
1892	...	51·13	1912	...	33·99
1893	...	77·89	1913	...	23·68
1894	...	55·86	1914	...	52·33
1895	...	66·86	1915	...	47·64
1896	...	51·18	1916	...	38·02
		——54·17 average.			—— 40·19 average.

1897	...	33·61	1917	...	37·68
1898	...	48·65	1918	...	54·03
1899	...	56·17	1919	...	39·23
1900	...	43·38	1920	...	34·29
1901	...	45·31	1921	...	35·12
1902	...	29·42	1922	...	45·71
1903	...	57·13	1923	...	65·38
1904	...	38·02	1924	...	56·46
1905	...	64·16	1925	...	44·09
1906	...	64·33	1926	...	35·05
		—— 48·01 average.			—— 44·70 average.

APPENDIX V.

Average Local Price Paid for Groundnuts for the last twenty-seven years.

Trade	1899–1900	Wharf Towns 1s. 6d.	Shipping Towns 1s. 9d.
„	1900–1901	„ 1s. 6d.	„ 1s. 9d.
„	1901–1902	„ 2s.	„ 2s. 3d.
„	1902–1903	„ 1s. 4d., 1s. 2d. ...	„ 1s. 7d., 1s. 2d.
„	1903–1904	„ 1s.	„ 1s. 3d.
„	1904–1905	„ 1s. 1d.	„ 1s. 4d.
„	1905–1906	„ 1s. 3d.	„ 1s. 6d.
„	1906–1907	„ 1s. 3d.	„ 1s. 6d.
„	1907–1908	„ 1s. 9d.	„ 2s.
„	1908–1909	„ 1s. 1d., 1s. 2d. ...	„ 1s. 4d., 1s. 2d.
„	1909–1910	„ 1s. 4d.	„ 1s. 7d.
„	1910–1911	„ 2s.	„ 2s. 3d.
„	1911–1912	„ 1s. 6d.	„ 1s. 9d.
„	1912–1913	„ 2s.	„ 2s. 3d.
„	1913–1914	„ 2s. 1d.	„ 2s. 4d.
„	1914–1915	„ 4d., 1s. 2d.	„ 7d., 1s. 2d.
„	1915–1916	„ 1s. 10d., 1s. 2d. ...	„ 2s. 1d., 1s. 2d.
„	1916–1917	„ 2s. 4d., 1s. 2d. ...	„ 2s. 7d., 1s. 2d.
„	1917–1918	„ 2s. 6d.	„ 2s. 9d.
„	1918–1919	„ 2s. 7d., 1s. 2d. ...	„ 2s. 10d., 1s. 2d.
„	1919–1920	„ 5s. 3d.	„ 5s. 6d.
„	1920–1921	„ 2s. 9d.	„ 3s.
„	1921–1922	„ 2s. 3d.	„ 2s. 6d.
„	1922–1923	„ 2s. 4d., 1s. 2d. ...	„ 2s. 7d., 1s. 2d.
„	1923–1924	„ 2s. 5d.	„ 2s. 8d.
„	1924–1925	„ 2s. 4½d.	„ 2s. 9d.
„	1925–1926	„ 2s. 2¼d.	„ 2s. 3¾d.
„	1926 1927	„ 2s. 6d.	„ 2s. 7d.

Note:—The above prices are only an average for each trading season. For instance, in 1919-1920 as much as 8s. per bushel of 28 lbs. was paid, this being the highest price ever paid in the Gambia.

APPENDIX VI.

Number of Immigrant or "Strange Farmers" Entering the Gambia Annually to Plant Groundnuts.

Year.	Number.
1912	6,525
1913	9,940
1914	14,908
1915	32,220
1916	9,315
1917	20,727
1918	20,509
1919	22,440
1920	24,150
1921	22,048
1922	20,566
1923	17,383
1924	14,188
1925	14,652
1926	13,553

APPENDIX VII.

TABLE SHOWING ANNUAL EXPORTS OF GROUNDNUTS FROM 1900 TO 1926.

Year.	Tons.	Value.
		£
1900	25,605	221,841
1901	25,750	172,405
1902	31,612	193,486
1903	45,477	275,394
1904	43,436	229,287
1905	29,499	169,426
1906	36,050	278,055
1907	40,858	256,685
1908	31,964	245,084
1909	53,644	323,231
1910	58,456	387,942
1911	47,931	437,472
1912	64,169	502,069
1913	67,404	622,079
1914	66,885	650,461
1915	96,151	400,434
1916	46,366	506,098
1917	74,300	869,790
1918	56,490	800,319
1919	71,677	1,172,843
1920	85,190	2,398,444
1921	59,175	628,901
1922	64,800	780,889
1923	64,178	864,885
1924	60,622	861,925
1925	48,700	693,097
1926	61,072	862,578

APPENDIX VIII.

Work Conducted at the Imperial Institute during the Year 1926 for the Gambia.

Economic Investigations.

During 1926 the following investigations were carried out for the Government of the Gambia :—

Groundnuts.—A number of different varieties of groundnuts are being cultivated experimentally in the Gambia, and during the year the Director of Agriculture forwarded twelve samples of nuts which have been produced in the trials. The varieties represented were :—Philippine White; Philippine Pink, No. 1; Gambia No. 1 and No. 2; Mauritius; Senegal; Zaria No. 1; Dixie Giant; and Basse; together with samples from the MacCarthy Island, the Upper River and South Bank Provinces.

The yields of oil from the whole nuts ranged from 36·6 to 37·7 per cent., except in one sample (Dixie Giant) in which a rather large portion of husk was present. The kernels furnished from 48·3 to 50·6 per cent. of oil, the yield thus exceeding in all cases the usual commercial standard of 48 per cent. The acidity of the oil was satisfactorily low throughout.

Two samples of groundnuts taken from commercial consignments in the Gambia as they were being loaded for despatch to Europe were subsequently forwarded in connection with an investigation by the Department of Agriculture to determine the extent to which the acidity of the oil increases during transit. The samples gave a satisfactory yield of oil (48·6 and 49·3 per cent. from the kernels) but in both cases the oil was found to contain a rather large amount of free fatty acid (about 3 per cent.).

Publications.

The following articles of interest to the Colony were published in the Bulletin during the year :—

"Kapok : A Survey of Its Production Within the Empire, with Notes on Its Cultivation and Uses."

"Machinery for Use in the Palm Oil Industry."

March, 1927.